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IMPROVED PRODUCTION KNOW-HOW

MARCH, 1944

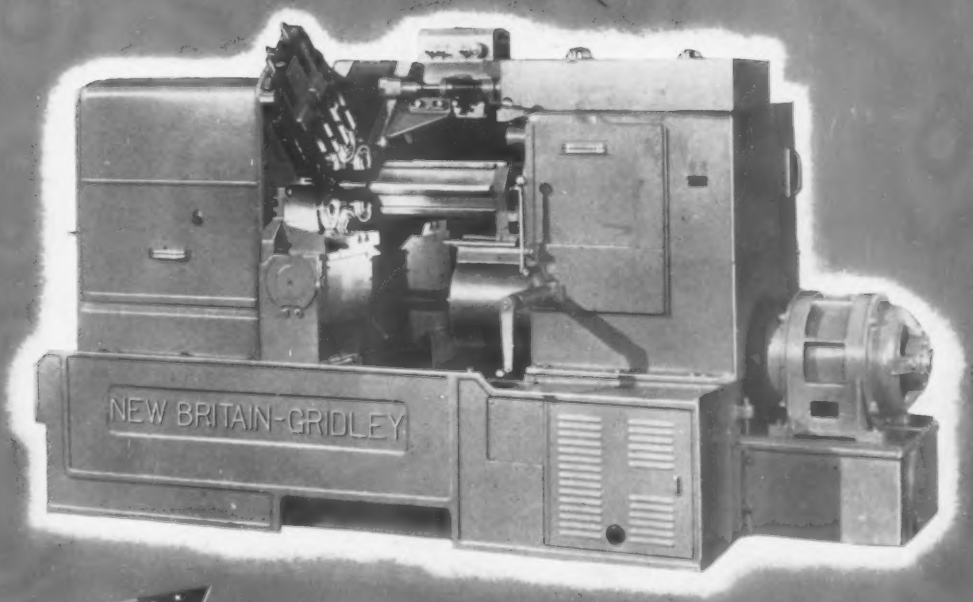
TOOL ENGINEER

Official Publication of
American Society of Tool Engineers

IF IT'S A...

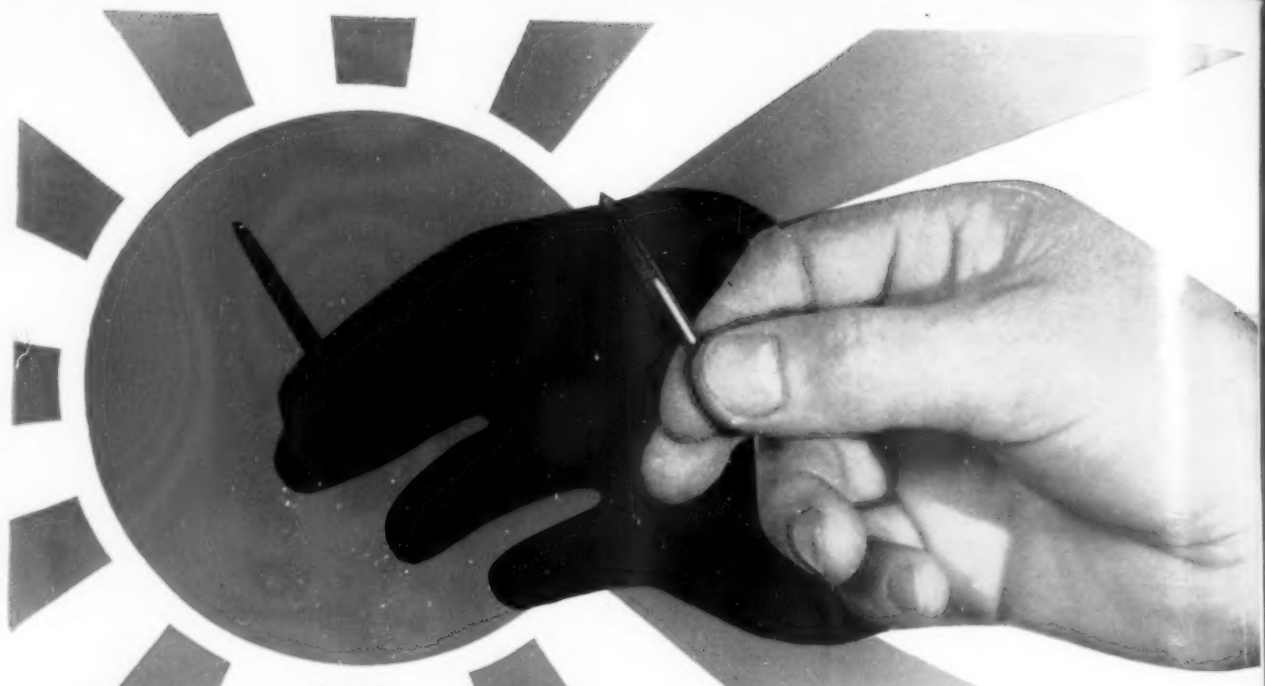
★ NEW BRITAIN ★

IT'S THE BEST THERE IS!



ARMY E NAVY

NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT



One More Shadow on the Rising Sun

TINY though it is, this particular Pratt & Whitney tap landed on Guadalcanal with the Marines . . . and saved American lives! Right under Jap positions this tap cut a new thread that kept a Marine's gun firing . . . and you know what happened. That Pratt & Whitney tap was part of American regular fighting equipment, and it proved as important as bullets. Do you blame us for being proud?

Our men make many thousands of taps at Pratt & Whitney without always knowing where they will be used. All kinds and sizes . . . standard and special . . . go through these skilled hands day and night. Yet each tap receives individual attention, from bar steel to final inspection. Pratt & Whitney taps play a big part in war production . . . our men will not knowingly pass any but the best. They know that many of them, like this tap from Guadalcanal, are in the hands of American fighters in every corner of the world . . . chosen because of outstanding Pratt & Whitney quality and performance. We will not violate that trust.

PRATT & WHITNEY

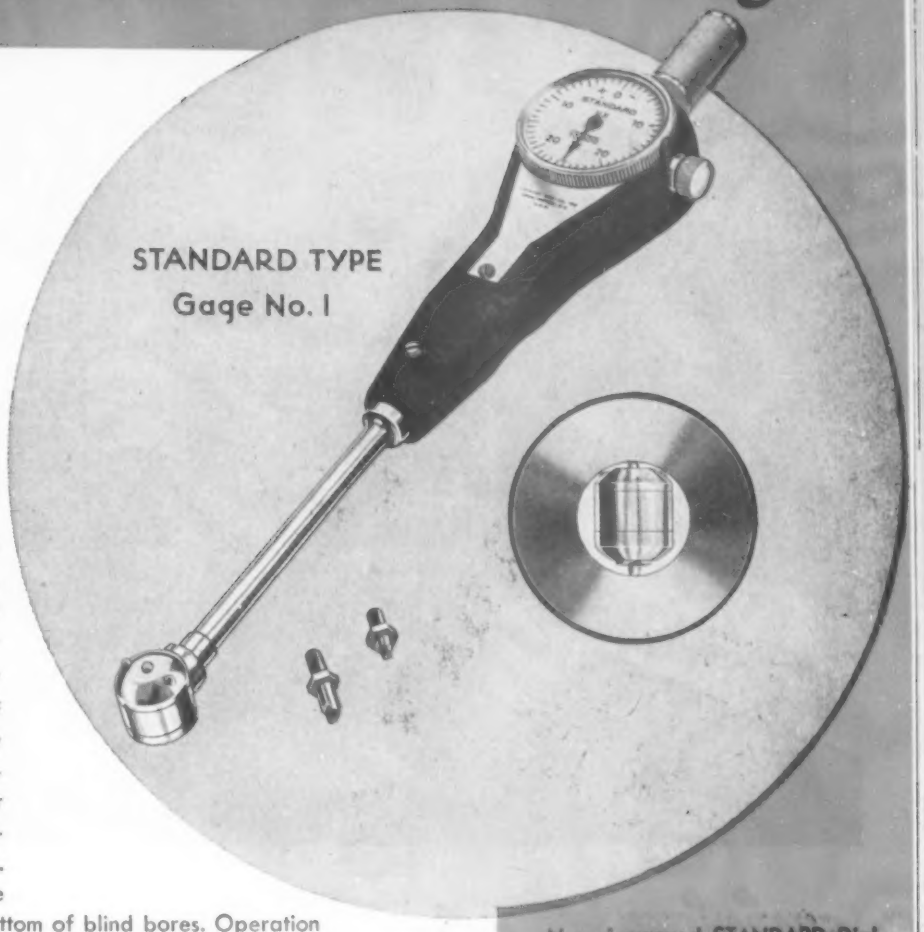
Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT

A NEW STANDARD Dial Bore Gage

for measurements ranging from 5/8" to 1" with UX Indicator graduated in .0001"

Fast, Light, Accurate...



HERE'S the newest addition to the STANDARD family of Dial Bore Gages. A small, lightweight, fast, close-tolerance checking instrument for small bores comparable in accuracy with the larger size dial bore gages.

Utilizing the same centralizing principle of other STANDARD Dial Bore Gages, it is only necessary to insert the gage, and rock handle slightly. Minimum reading on indicator shows exact diameter. Even holes with obstructions such as shoulders, webs, undercuts, etc., can be measured because this Dial Bore Gage can measure within ¼" from the bottom of blind bores. Operation is reduced to a minimum; accuracy and precision assured; and the range of workability is considerably increased as a result of improved design.

Other Dial Bore Gages with measuring range to 12⅛" completely illustrated and detailed in our new No. 10 Catalog. Send for it.

New, improved STANDARD Dial Bore Gage with diameter extensions furnished with each gage. Cross section shows gage in use.

STANDARD Dial Snap Gage

Combines Snap Gage Speed with Comparator Precision

STANDARD Dial Snap Gages combine PORTABILITY with speed in use and absolute accuracy on dimensions as fine as .0001". Adjustable gaging pin has a serrated flat surface tipped with tungsten carbide that practically defies wear. Opposite movable pin has mushroom top, also tungsten carbide. Point-and-plane construction assures continued, accurate readings whether instrument is set by cylindrical or flat standards.

16 Stock Sizes cover Range 0" to 8". Each can be set to measure any dimension within a range of ½". Sizes measuring up to 4" designed as at right. Sizes 4" to 8", because of larger size, are made with convenient finger hole grip for greater ease in handling.

Write for Special Bulletin on STANDARD Dial Snap Gages.

ARMY (E) NAVY

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

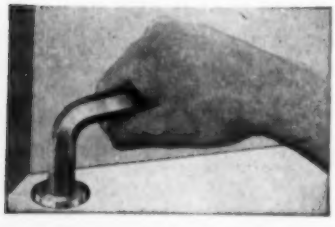
HOLO-KROME

GUARANTEED *Unfailing* PERFORMANCE

THEY'RE
COMPLETELY COLD FORGED

HOLO-KROME FIBRO FORGED Alloy Steel Socket Screws are guaranteed by Holo-Krome to give Performance — Unfailing Performance . . . These Completely Cold Forged Alloy Steel Screws (method patented and used solely by Holo-Krome) are precision made to exacting standards. Uniform accuracy and quality of finish . . . Tough fastening jobs are handled with a saving of weight in the parts to be assembled plus saving space and time due to the internal wrenching feature.

SPECIFY "HOLO-KROME"



QUICK & POSITIVE TIGHTENING DUE TO INTERNAL WRENCHING

THE *BETTER* FASTENING METHOD

THE **HOLO-KROME** SCREW CORP. — SOCKET SCREW PRODUCTS — HARTFORD 10, CONN. U. S. A.

VOLUME XIII MARCH, 1944 NUMBER 3

THE TOOL ENGINEER

T.M. REG. BY AMERICAN SOCIETY TOOL ENGINEERS

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Publisher's Letter

AS we go up and down and 'round about this wonderful country of ours we are more and more impressed with people. We're led to ponder on the last one hundred and seventy-five years of this nation ...to think about what we were... what we are... what we'll be when this war is over.

•

Following the Revolutionary War we were in dire competition with England whose industry was highly mechanized... we had to buy from her, even though we'd rather have made our own. We were then essentially a wilderness of farmers and a few tradesmen who knew not the rudiments of mass production—or, manufacture on any basis, other than by the crudest methods of hand labor and processing. After a time a few of our workmen became more skilled than their fellows and developed machines to replace much of the arduous hand work.

In those early days these men must have been the progenitors of modern production engineers, for today while we consider machine tools "the master tools of industry" we realize production engineers are the "masters of machines".

•

When, in those early years, we began in New England to manufacture in a small way what our people needed and wanted we were forced to sell our products to a great many but at small profit. People were poor in those days. Mass manufacturing was thus promoted by sheer necessity.

We have faith, most of us, that people are getting closer to the highest concept of man—closer to our Maker—closer to man's dominion and power. We see progress everywhere we go. Our skills and aptitudes are attaining higher goals. You old-timers remember back in '18 when feeds of 75 fpm were good, and then Stellite came in and feeds of 200 fpm or more were visualized with wonderment and satisfaction... and later, much later carbides again changed all our thinking... and now—and after the war—new "fantastic" speeds and feeds.

I'm glad and proud that we can contribute in this publication to the progress of mankind. Production of the multitudes of things that make life more enjoyable, easier, more complete, more luxurious, mean unmistakable progress for mankind and the world.

•

We strive very hard to give you in every issue just as much "know-how" along these lines as we can. As you turn the pages, I'm sure you will find evidences of what we've said here and I hope you'll read them with profit to yourself and to your company.

See you next month.

Cordially yours,

Roy T. Bramson

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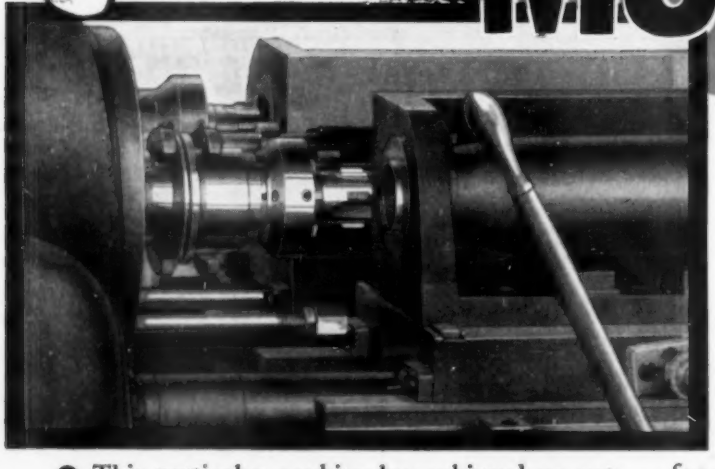
More Shells - Better Shells to Smash the Axis

with **MURCHEY**



No. 22 . . . SHELL TAPPING MACHINE

● This particular machine has achieved an outstanding record in the production of shells and bombs. It is arranged with tap for tapping the nose ends of shells and bombs. May be arranged with die heads with which to thread component parts. Also equipped with lead screws to guarantee positive leads and with precision fixtures for perfect alignment. Capacity Machine Threads —½″ to 2″ U. S. S. Inclusive; ½″ to 2½″ S. A. E. Inclusive. Capacity Pipe Threads—½″ to 2″ Inclusive. Write for descriptive catalogue.

. . .

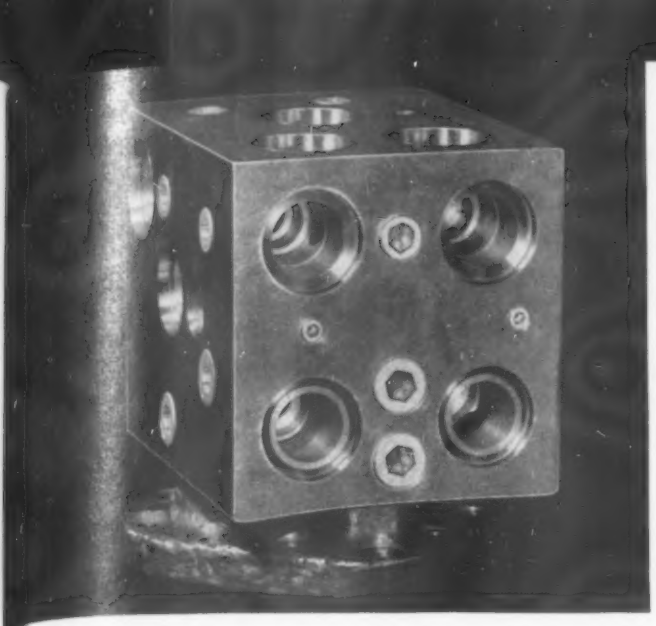
Also ask for catalogue on No. 32 and on No. 42 Thread Milling Machines.

MURCHEY MACHINE & TOOL COMPANY • DEPT. T, DETROIT 26, MICHIGAN

We still have opportunities for exclusive distributor representation in — St. Louis, Memphis, the entire states of Washington and Oregon; Northern California, the entire states of Idaho, Montana, Nevada, Utah, Wyoming, Colorado, New Mexico, North Dakota and Nebraska. Write for information.

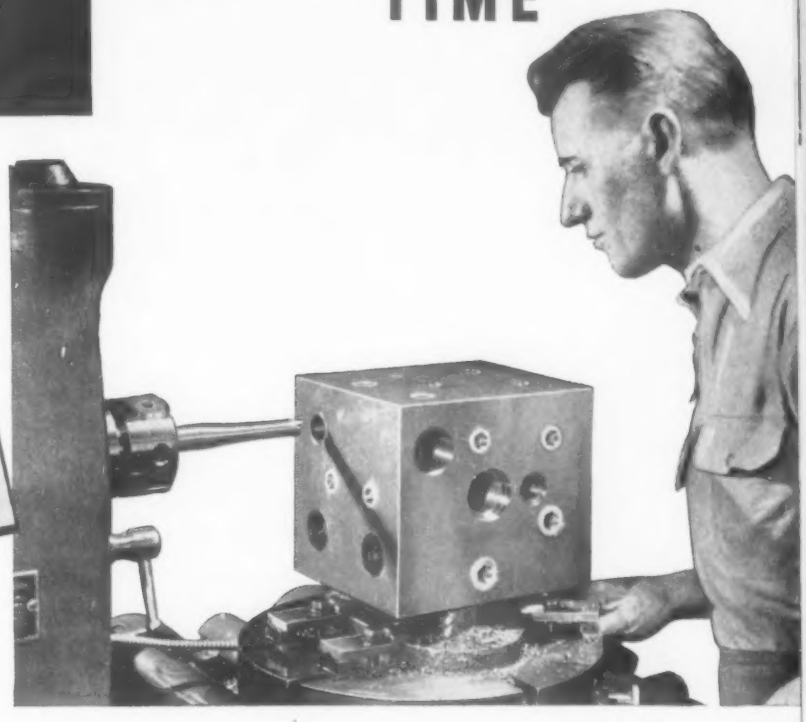
MURCHEY

Murchey also manufactures all types of Self Opening Die Heads and Collapsible Taps. Literature on request.



BORING 8 MULTIPLE DIAMETER HOLES

— at one setting — with 30% SAVING IN TIME



• • ANOTHER EXAMPLE OF THE TIME-SAVING, PRECISION PERFORMANCE OF THE AUTOMETRIC MODEL B

(Photos and performance data courtesy of C. B. COTTRELL & SONS CO.) Milwaukee, Wisconsin

Take a good look at the work-piece shown above—a centrifugally-cast steel unit requiring the precision boring of a total of 8 holes — 5 of them with multiple diameters and 3 holes (2 with 1½ inch diameters, 1 with 1¾ inch diameter; 7½ inches long) which must be held to within .0002 on the diameter throughout the entire depth.

Sure, it's a tricky job but a "natural" for the Autometric Model B Precision Jig-Boring Machine. The piece was rough drilled before being brought to the Autometric where it was finish bored to specifications—at one setting—with a 30% saving in time over other methods.

Such fast, precision performance is possible on the Autometric Model B because it is the only jig-borer, with a built-in rotary table, capable of boring holes on all sides of a work-piece *at one setting.*

Many shops consider the Autometric Model B as indispensable equipment for fast, precision boring of a wide variety of parts and pieces.

Autometric Model B Features:

★ Errorless measuring — more rapidly, more accurately — by the Autometric method.
★ Infinite variation of spindle speeds by fingertip control.
★ Infinite selection of feeds by fingertip control.
★ Hardened — ground — super-finished steel ways.

Write for complete information on the Autometric Model B Jig-Boring Machine.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker Products CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

THE public is due for many pleasant surprises after the war—as new materials are released at the fighting fronts and converted into the products of peace.

Perhaps *you* are planning to utilize some of these new materials in your own processes. More power to you, if they give your customers a *better* product—or cost less—or create a bigger market for themselves.

But even the newest materials don't just "jump together." Quantity production will call for *more* drilling and reaming, no doubt. After the war, you can order Cle-Forge High-Speed Drills and Peerless High-Speed Reamers in the same confidence you have always had—that they will continue delivering top quantity *and* quality production per tool, per grind.

More than ever you can depend on your ◇ Industrial Supply Distributor for all of your thousands of items—using him as your central source instead of scattering your orders among many manufacturers. Thus, as you improve your production with new Materials—improve your relations with your Supply Distributor, too. It's easy—and it *pays*—to

Telephone your ◇ I S D ◇ FIRST!

◇ C ◇

ARMY NAVY

ARMY E NAVY

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

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On a GORTON 16-A Precision

TOLERANCES ±.0005" ON ALL DIMENSIONS

PRECISION plus HIGH PRODUCTION on Small Parts

ON EVEN COMPLEX PARTS like this at right . . . HIGH PRODUCTION . . . FINE FINISH . . . HIGH PRECISION . . . Tolerances within ±.0005" on all dimensions are obtained on the Gorton 16-A Precision Automatic Screw Machine using single-point, low cost tools.

Each part is *completed* within the close limits specified in only one operation.

This precision performance on long production runs is made possible by the rigid construction of the Gorton 16-A, one of the heaviest Swiss-type screw machines built.

Wide Range of Work

The Gorton 16-A produces an almost endless variety of short or long, slender parts — diameters .005" to 7/16", lengths 1/32" to 2¾"—complete in one operation.

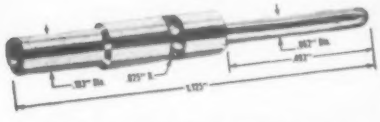
It does step turning, generates curves, tapers, back recesses, knurls, chamfers, etc. It centers, drills, slots, threads or taps.

Tool slides are easily accessible. Micrometer adjustments for all tools insure accurate, quick setups at low cost. Centralized finger-tip controls provide infinitely variable spindle speeds (1100 to10,000 R.P.M.) and infinitely variable cam feeds (20 to 720 pieces per hour; 20 to 1440 optional). No speed or feed gears to change.

GORTON Complete Cam and Tool Service

For Any Make Swiss-Type Screw Machine — Gorton or Others

Gorton exclusively offers a complete cam and tool service. Highly skilled engineers are available to take care of all your needs. This service consists of a detailed cam and tool layout, listing all operations of the machining cycle together with necessary cams, tools, collets and bushings. This service is available at the Gorton factory at Racine, Wis., for the Midwest and Pacific areas; and from Russell, Holbrook, and Henderson (our Eastern Distributors) of New York City for quick service in the East.



THIS PART COMPLETED *in One Operation*

IN LESS THAN 9 SECONDS

Tooling: Five flat cams, one bell cam, five cutting tools, one drill, two collets, one bushing.

OPERATIONS

1—Center for #49 drill.
2—Turn .103" dia. and form 54° angle. Drill #49 dia. hole .281" deep.
3—Form .075" dia. groove.
4—Form 25° angle and turn .062" dia.
5—Form .031" radius and cut off finished part.

Material: .125" Round Free Cutting Brass.

Production: 7 pieces per minute.

These other typical parts shown actual size

GEORGE GORTON MACHINE CO.
1322 Racine St., Racine, Wis.

Send me, without obligation, FREE bulletin with complete information covering the Gorton 16-A Precision Automatic Screw Machine.

Name..... *Title*.....
Company.....
Address.....
City..... *State*.....

GET THE FACTS NOW

Mail Today for FREE Bulletin

GEORGE GORTON MACHINE CO.
1322 RACINE STREET, RACINE, WISCONSIN, U. S. A.

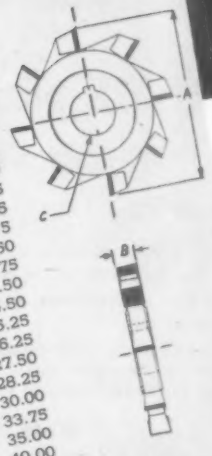
Look at these NEW 25% LOWER PRICES ON SUPER Milling Cutters!

For Milling Cast Iron, Non-Ferrous and Other Materials

Tool No.	Dia. "A"	Width "B"	Hole "C"	No. of Teeth	Price
3-GP-1	3"	¼"	1"	4	$12.00
3-GP-2	3"	5/16"	1"	4	12.50
3-GP-3	3"	⅜"	1"	4	10.00
3-GP-4	3"	7/16"	1"	4	11.00
3-GP-5	3"	½"	1"	4	12.00
4-GP-1	4"	¼"	1"	4	13.00
4-GP-2	4"	5/16"	1"	4	13.50
4-GP-3	4"	⅜"	1" or 1¼"	4	12.50
4-GP-4	4"	7/16"	1"	4	13.50
4-GP-5	4"	½"	1" or 1¼"	4	14.25
4-GP-6	4"	5/8"	1"	4	15.00
4-GP-7	4"	¾"	1" or 1¼"	4	16.00
4-GP-8	4"	⅞"	1" or 1¼"	4	17.00
5-GP-4	5"	7/16"	1¼"	6	17.50
5-GP-5	5"	½"	1" or 1¼"	6	17.75
5-GP-6	5"	5/8"	1¼"	6	18.50
5-GP-7	5"	¾"	1¼"	6	18.75
5-GP-8	5"	⅞"	1" or 1¼"	6	20.50
6-GP-5	6"	½"	1" or 1¼"	6	21.75
6-GP-7	6"	¾"	1¼"	6	24.00
6-GP-8	6"	1"	1" or 1¼"	6	27.00
6-GP-10	6"	1¼"	1¼"	6	37.00
8-GP-8	8"	¾"	1¼" or 1½"	8	40.00

For Milling Steel

Tool No.	Dia. "A"	Width "B"	Hole "C"	No. of Teeth	Price
3-ST-1	3"	¼"	1"	6	$14.00
3-ST-2	3"	5/16"	1"	6	14.25
3-ST-3	3"	⅜"	1"	6	14.75
3-ST-4	3"	7/16"	1"	6	15.50
3-ST-5	3"	½"	1"	8	16.25
4-ST-1	4"	¼"	1"	8	17.00
4-ST-2	4"	5/16"	1"	8	17.75
4-ST-3	4"	⅜"	1" or 1¼"	8	18.25
4-ST-4	4"	7/16"	1"	8	18.75
4-ST-5	4"	½"	1" or 1¼"	8	19.50
4-ST-6	4"	5/8"	1"	8	20.75
4-ST-7	4"	¾"	1" or 1¼"	8	22.50
4-ST-8	4"	⅞"	1" or 1¼"	8	24.50
5-ST-4	5"	7/16"	1¼"	10	25.25
5-ST-5	5"	½"	1" or 1¼"	10	26.25
5-ST-6	5"	5/8"	1¼"	10	27.50
5-ST-7	5"	¾"	1" or 1¼"	10	28.25
5-ST-8	5"	⅞"	1" or 1¼"	10	30.00
6-ST-5	6"	½"	1¼"	12	33.75
6-ST-7	6"	¾"	1" or 1¼"	12	35.00
6-ST-8	6"	⅞"	1¼"	12	40.00
8-ST-8	8"	¾"	1¼" or 1½"	12	48.00



and Remember . . .

Low first cost is only one of the many economies you'll enjoy when you use Super Carboloy Tipped Milling Cutters. Other money-saving features include: faster milling, greater accuracy because of less work distortion, finer finishes, and more work because of less machine down time. Try Super Carboloy Tipped Milling Cutters and you, too, will agree . . . they are MONEY SAVERS!

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California

EXPERIENCE? THIS AUTOMATIC LATHE SUPPLIES IT!

"LOOK! This machine can turn many different kinds of parts needed by our armed forces—in big volumes! All *you* have to do is put the rough forging right here—and pull the little starting lever. When the machine stops—you take it out, put in another. The *lathe itself* knows how to do the rest—faster than anyone here could do it!"

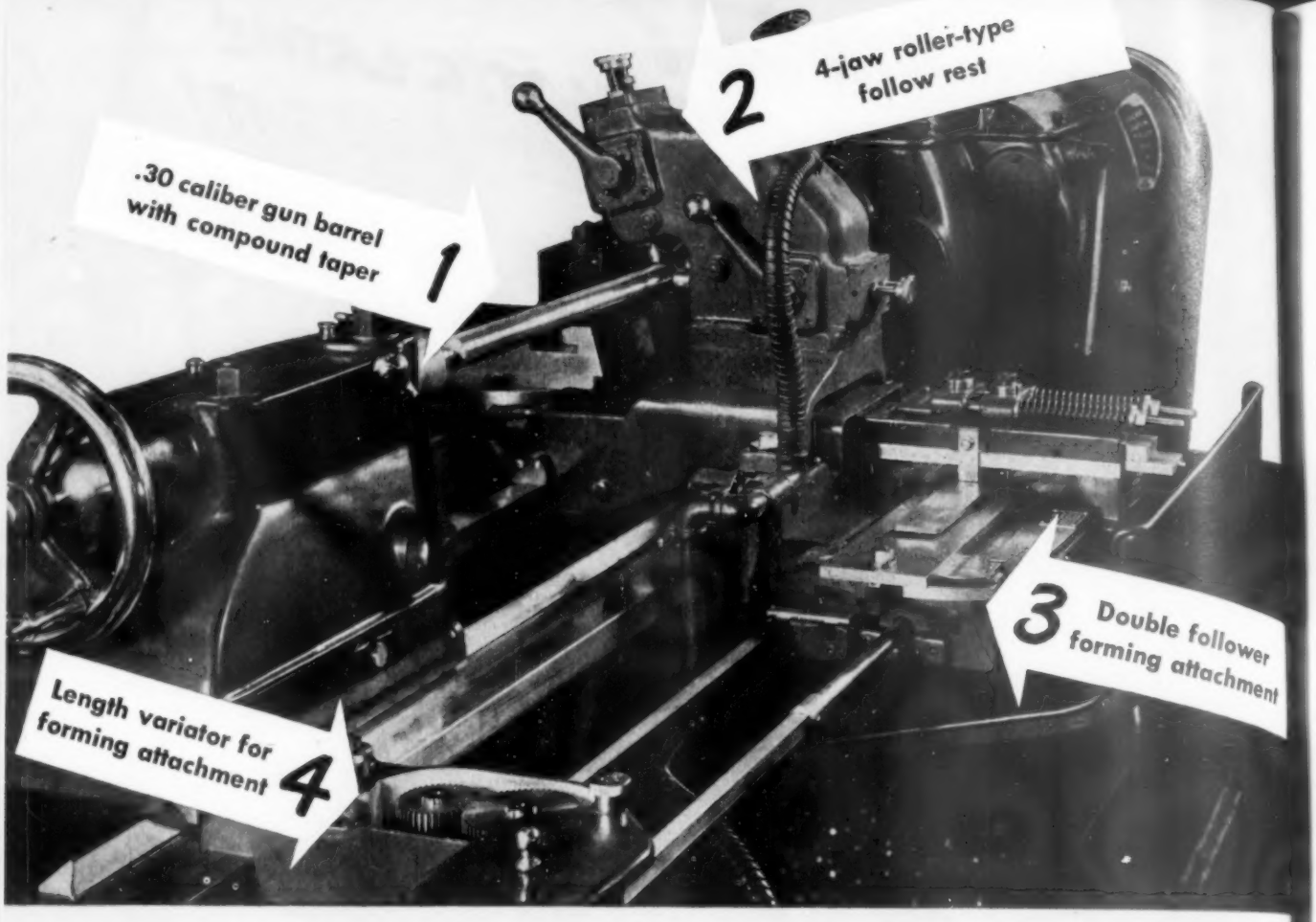
THE GISHOLT NO. 12 HYDRAULIC AUTOMATIC LATHE is one of the machines that practically eliminate the training problem. Adaptable for a wide variety of between-centers and chucking work, it is capable of sustained high speed production within close limits of accuracy. Write for complete information.

GISHOLT MACHINE COMPANY
1219 Washington Ave. • Madison, Wis.

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

LOOK AHEAD • KEEP AHEAD • WITH GISHOLT IMPROVEMENTS IN MACHINE TOOLS



How to turn compound tapers!

Compound tapers are tricky to turn, especially to the extremely close tolerances required for gun barrels. Here is how it is done fast and accurately on the Monarch form turning lathe.

1. The work—.30 caliber gun barrel with compound taper.

2. This 4-jaw roller-type follow rest has adjustable spring tension on each jaw. Eccentric levers enable the operator to engage the jaws with the work, one ahead and the other behind the cut.

3. The Monarch double follower forming attachment works from a single template, with the rear follower spring loaded. Index automatically guides the tool to produce the required shape.

4. The length variator for the forming attachment allows the use of a template which may be longer or shorter than the work itself.

With this Monarch equipment, the variations of manual control are eliminated —and of prime importance—one operator can tend two or three machines, releasing manpower for other work.

And when production of the things for better living . . . more goods for more people at lower cost . . . can start again, Monarch lathes will give as good performance as they have in war production.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

MONARCH LATHES

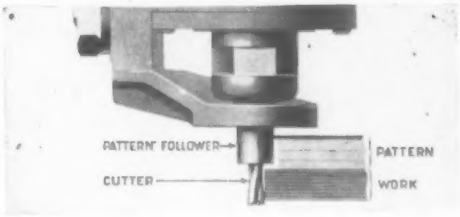
Save Time

FIRST—And Still Leading

It was in 1936 that an Onsrud router first made practical the technique of high speed, fast feed cutting of sheet aluminum aircraft alloys. Machines like this Onsrud Radial Arm Router are still providing the most efficient, speediest production of the many nonferrous parts they're capable of handling.

This particular machine has a 114" reach covering all points on two 4' x 12' work tables set at opposite sides of its base. Routing and drilling of stacked sheets may be done in one setup. A total thickness of ¾" of stacked sheets can be cut at one time with savings in time and material that are readily apparent.

To find out what Onsrud equipment and engineering service can do for you, send for bulletin describing this machine today. If you prefer, just write us about your nonferrous cutting problems —our engineers can probably help with cost-free suggestions or recommendations.



A pattern is fixed to the stacked flat or corrugated sheets. Pattern follower travels along pattern's side allowing cutter to reproduce the desired shape in the work. Both inside and outside cuts are made accurately and speedily and the 15,000 RPM spindle speed of the machine assures that finished work has clean, finish-smooth edges.

Onsrud radial arm machines are also available for fast accurate flat sheet drilling as well as routing.

Onsrud

ONSRUD MACHINE WORKS, INC.
3927 Palmer Street • Chicago 47, Illinois
Sales Offices in all Principal Cities

NEW TOOLS FOR OLD

FOR ONLY 15 CENTS* ON THE DOLLAR!

REGRINDING BY NEW TOOL CRAFTSMEN

As originators of Midget Milling cutters, Severance tool makers have the "know-how" when it comes to regrinding worn, dulled tools.

In the regrinding of a worn tool the process is the same as the grinding of a new one. Each flute must have the correct pitch and depth so the finished tool will take deep sharp bites without chatter.

After being accurately reground, your renewed tools are further improved by the "Severite" heat treat process that gives additional hardness to the teeth and increases the cutting life from three to five times.

Worn rotary files, can also be converted into sharp, good-as-new Midget Milling cutters by Severance craftsmen.

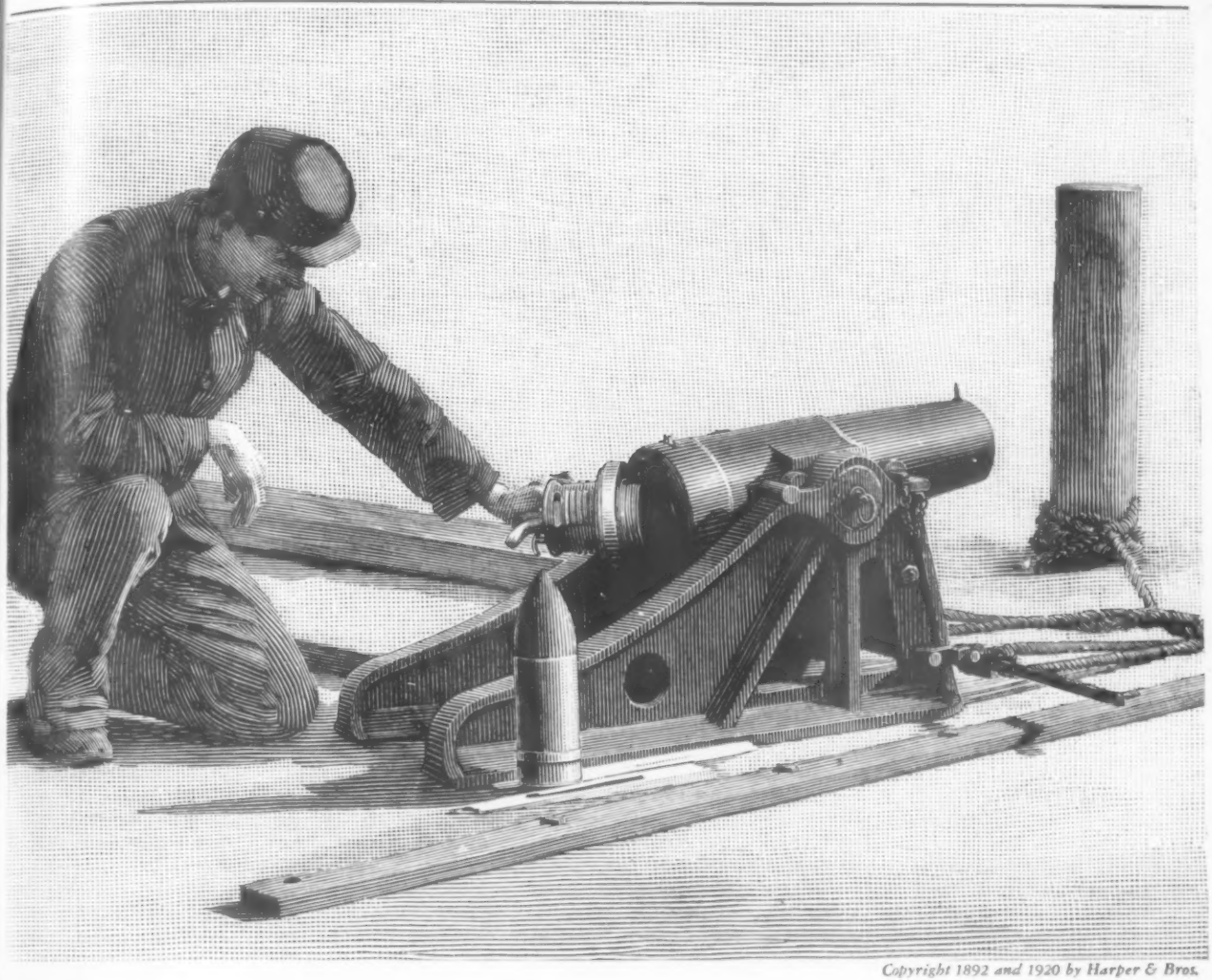
Check up on the worn and dulled tools in your plant now. For best service, send them to the Severance plant nearest you for a factory regrinding job.

★ OUR LIST PRICE.

Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING
SEVERANCE TOOL INDUSTRIES INC., SAGINAW, MICH. •
PLANTS IN LONG ISLAND CITY, N.Y.; DETROIT, MICH.;
FORT WAYNE, IND.; CHICAGO; AND LOS ANGELES

"This is a Grinding War . . ."



Copyright 1892 and 1920 by Harper & Bros.

MORTAR'S GRANDPA

You could pick up this U. S. mortar about as easily as you could move a safe and it was about as easy to move around. But its advocates back in the nineties foresaw the importance of such armament in modern warfare.

Today's version can be carried at a brisk trot by a couple of men. It can go into action in seconds. It's a precision weapon —precision built, facts that many a Nazi and Jap have discovered with a jolt.

Where did a lot of the modern mortar's precision come from? From a little iron-bowl furnace in which over 52 years ago, Dr. Edward Goodrich Acheson created the first man-made abrasive. Since then abrasive products have become one of our most important production tools in the skilled hands of American industry.

Abrasive wheels are used to grind the parts of mortars, plane and tank engines, giant guns and other war weapons to unbelievable accuracy.

This accuracy is responsible not only for the efficient performance of these weapons—it also makes their mass production possible.

For mass production depends on interchangeability of parts. And interchangeability depends on split-hair precision.

Today it is almost impossible to put your finger on a single article mass produced for war or for peace that isn't in some way touched by grinding. On the land, in the air, on and under the sea, material produced by abrasive manufacturing methods are blasting the path to victory for the United Nations.

We at Carborundum are mindful that "this is a grinding war." Our efforts and resources are pledged to making it as short as possible.

* * *

Every hour this war is shortened will save $12,000,000. The lives it will save are priceless. So please remember that grinding wheels, too, are "Weapons for Production"... use them wisely to help end the war sooner.

The Carborundum Company, Niagara Falls, New York.

ARMY E NAVY

THE CARBORUNDUM COMPANY

CARBORUNDUM AND ALOXITE ARE REGISTERED TRADE-MARKS OF AND INDICATE MANUFACTURE BY THE CARBORUNDUM COMPANY

MORE · BETTER · FOR LESS!

WRITE FOR NEW ROLL FORMING BULLETIN

Many fabrication problems have been solved by the roll forming of strip metal.

STRENGTH IS ADDED TO PARTS
CHEAPER BASE METALS CAN BE USED
MACHINING IS REDUCED OR ELIMINATED

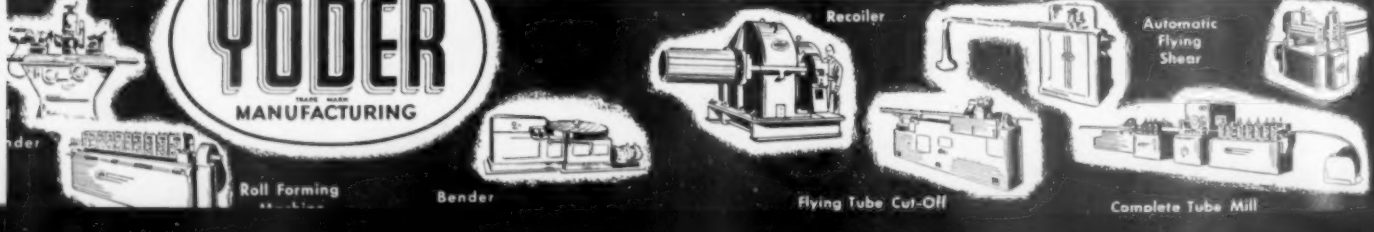
The Yoder Company has led in the engineering and manufacturing of a complete line of roll forming machines and auxiliary equipment, for over thirty years.

If you have a product and would like to know whether Yoder Roll Forming can be used to advantage . . . if you have a "hunch" on the making of a new product . . . if you are "stumped" . . . won't you write us? Send rough sketches, blueprints and notes. We'll be glad to make suggestions and present an estimate of cost.

THE YODER COMPANY • 5500 Walworth Ave., Cleveland 2, Ohio, U.S.A.

METAL • WORKING • PRODUCTION • MACHINERY

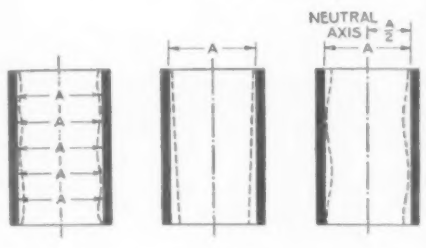
ENGINEERING **YODER** MANUFACTURING



MICROMATIC offers you
THE HYDROHONER

**[Accuracy, Uniform Size
Stock Removal
Controlled Surface Finish]**

THE HONING PROCESS



Diametric Roundness

GENERATES Diametric Straightness

Axial Straightness

CORRECTS Taper

Out-of-roundness

Axial Distortion

Micromatic Hydrohoner—
With Automatic Microdial . . .
Precision Hones to uniform size.
Machine stops when correct size is reached.

Micromatic Honing is a process for finish machining cylindrical surfaces—internal or external by means of controlled abrasion.

Abrasive sticks positively expanded by the hone, are rotated in contact with the work and are given one or more reciprocating motions at the same time—all actuated under extremely low speeds and pressures.

Stock is removed at rates up to .001″ per minute on diameter—to more than 1 cubic inch per minute in volume on hard, forged steel.

Roundness is generated—out-of-roundness is corrected within tolerances as low as .0001″ in many applications. Taper is corrected and diametric and axial straightness is generated by stones long enough to overcome deformity.

Uniform size is generated in high production to tolerances as low as .0005″.

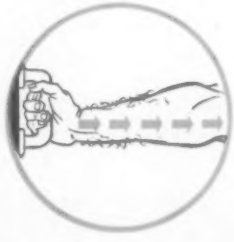
Microhoned surface finish may be controlled to any degree—from matte (grey) to mirror (black).

Micromatic
HONE CORPORATION
Detroit 4, Michigan

MAKERS OF HONING MACHINE TOOLS

T-J GETS THE SHOP MAN'S O.K.

FOR POWER MOVEMENT IN ANY DIRECTION



When T-J Air or Hydraulic Cylinders "take over" a job of power movement...experienced shop men know these Cylinders will deliver top efficiency in every stroke!

Whether it's a mechanical movement requiring pressure to clamp...press...raise ...or shift—T-J Cylinders do the job *right!* Designed for compactness, these Cylinders are accurately machined for correct mounting and highly efficient performance. Cylinder bores are honed to accurate concentricity, then hard chrome plated. Available in many standard sizes and styles...both cushioned and non-cushioned types. T-J engineering and skilled workmanship assure utmost dependability. Send for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

Reduce Replacement Costs

by Hard-Facing with Haynes Stellite Rods

THE life of wearing parts of industrial machines and equipment can in many cases be increased from 2 to 25 times by hard-facing with Haynes Stellite rods.

Hard-Face All Parts— Old and New

Old parts which are badly worn can often be reclaimed and armored against wear by applying Haynes Stellite rods. To assure maximum savings, it usually pays to hard-face new parts—*before* wear occurs. Then when long use finally does impair their efficiency, most parts can be hard-faced again and again for added service.

Other Advantages of Hard-Facing

The use of Haynes Stellite hard-facing materials frequently permits use of cheaper base metals—or makes possible the use of a readily available substitute base metal when the usual kind cannot be obtained. When cutting or scraping edges are hard-faced, they stay sharp longer, often reducing power consumption. Time out for repairs is cut down by hard-facing, and this helps maintain high production schedules. At the same time, hard-facing decreases maintenance work and solves many replacement problems.

Wherever abrasion . . . impact . . . heat . . . or corrosion . . . are encountered, there's a Haynes Stellite rod to furnish lasting protection. Write for a descriptive price list.

A Rod for Every Purpose

STELLITE ROD – the original non-ferrous cobalt-chromium-tungsten hard-facing alloy –now available in three different grades– high in "red hardness," highly resistant to abrasion and corrosion–applied by oxy-acetylene or electric-arc process.

HASCROME ROD–iron-base hard-facing rod containing chromium and manganese – work-hardens under impact – applied by oxy-acetylene or electric-arc process.

STELLITE "93" ROD – iron-base hard-facing alloy containing more than 40 per cent of alloy ingredients – hard and abrasion-resistant – applied by oxy-acetylene or electric-arc process.

HAYSTELLITE INSERTS–cast tungsten carbide in 13 standard shapes and sizes–extremely resistant to abrasion–generally applied by oxy-acetylene process with high-strength steel rod as binder.

HAYSTELLITE TUBE ROD–tungsten carbide grains of 9 standard screen sizes in high-strength steel tubes–extremely wear-resistant–applied as hard-facing rod, generally by oxy-acetylene process.

HAYSTELLITE COMPOSITE ROD–tungsten carbide grains of 4 standard screen sizes uniformly distributed in high-strength steel binder – extremely wear-resistant – applied as hard-facing rod, generally by oxy-acetylene process.

HAYNES STELLITE COMPANY

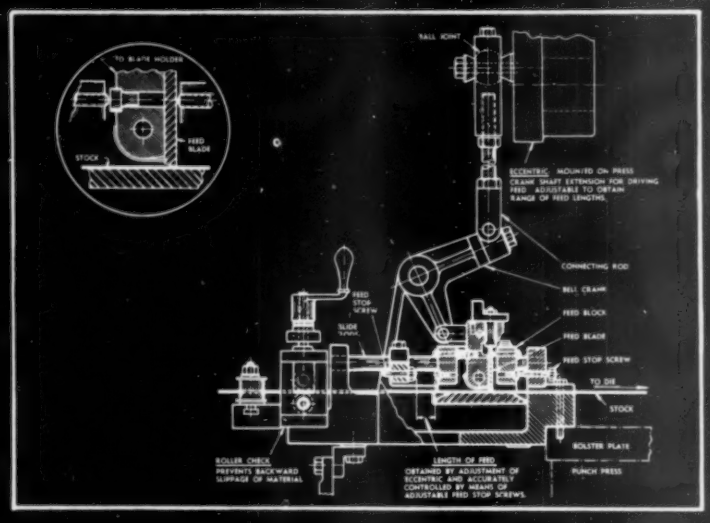
Unit of Union Carbide and Carbon Corporation

New York 17, N. Y. UCC Kokomo, Ind.

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

HARD-FACING RODS FOR EVERY PURPOSE

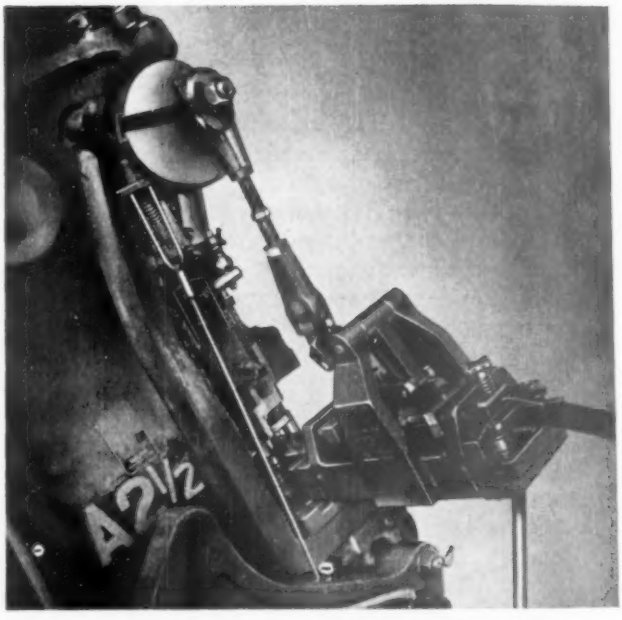
"Stellite," "Haystellite" and "Hascrome" are registered trade-marks of Haynes Stellite Company.



U. S. Slide Feeds—FOR CONTROLLED ACCURACY OF FEEDING WITHOUT PILOTS

For the production of punch press stampings necessitating accurate control of feed lengths, we know the U. S. Slide Feeds can be used to advantage in your plant. The accuracy of these feeds enables their use for feeding material into multiple stage dies without the use of pilots; one operator can attend to a battery of presses inasmuch as the operation of feed is automatic. The use of the U. S. Slide Feeds materially reduces tool maintenance when compared to other types of feeding, such as roll feeds or hand feeding. In addition, the quantity of stampings obtained between die grinds is substantially increased.

The U. S. Slide Feeds are designed for feeding coil stock into punch presses as shown in the illustration at the right, and are made in a range of sizes to accommodate various widths of materials and feed lengths.



A brief description of the method of operation is as follows (refer to sketch at top of page):

1. The reciprocal motion of the slide block is controlled by means of an eccentric mounted on the press crankshaft extension. Links and connections between the eccentric and the feed block transform the circular motion of the eccentric to linear back and forth motion of the feed block.

2. Adjustment of the eccentric determines the length of feed (pitch).

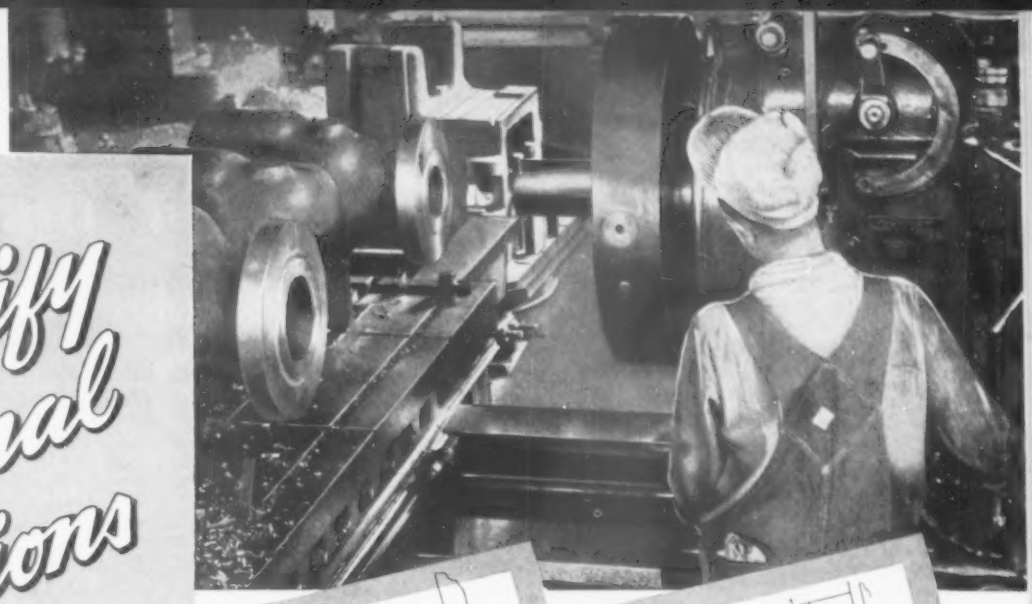
3. The feed stop screws are then set to accurately control the motion of the feed block to automatically repeat the exact feed length at each stroke of the press.

Complete specifications are contained in Bulletin No. 50T. Ask for your copy. Also described in this catalog are the U. S. Stock Straighteners, Stock Reels, Coil Cradles, Stock Oilers, etc. for use in conjunction with our Automatic Feeds. A brief description of the U. S. Slide Feeds and Accessories and also the U. S. Multi Millers and Multi Slide Machines will be found in Sweet's Catalog File, 1943 Edition, Volume 1 of Mechanical Industries (Machine Tools & Production Equipment) Section 1a/76a.

Inquiries are invited; and upon receipt of complete information regarding your particular application, we shall be glad to submit a recommendation on equipment for your work.

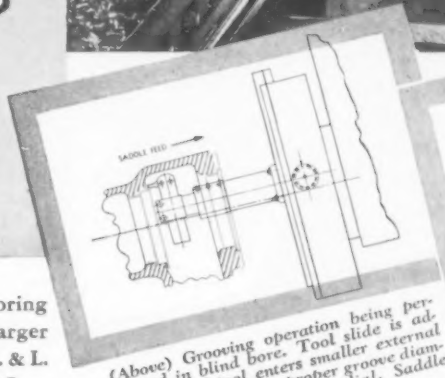
U. S. TOOL COMPANY, INC., Ampere, (East Orange), N. J.

BUILDERS OF U. S. MULTI SLIDES, U. S. MULTI MILLERS, U. S. AUTOMATIC PRESS ROOM EQUIPMENT, U. S. DIE SETS AND ACCESSORIES

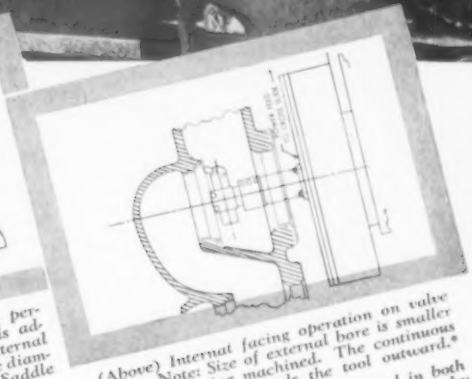


(Right) View showing boring operation on valve bodies using main spindle. The Continuous Feed Facing and Boring Head is mounted on the machine and in no way interferes with the independent operation of the spindle.

HOW TO *simplify internal operations* LIKE THESE

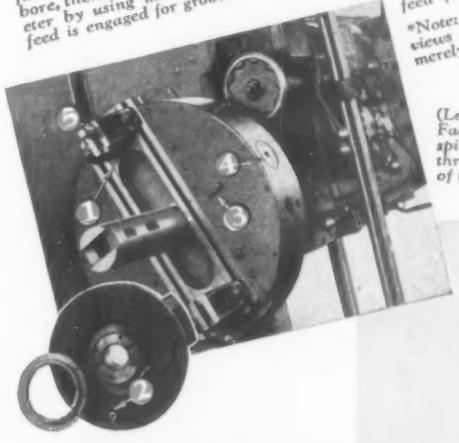


(Above) Grooving operation being performed in blind bore. Tool slide is adjusted until tool enters smaller external bore, then set out to proper groove diameter by using micrometer dial. Saddle feed is engaged for grooving.*



(Above) Internal facing operation on valve body. Note: Size of external bore is smaller than bore being machined. The continuous feed facing head feeds the tool outward.*

*Note: All operations shown in red in both views are performed in the same setup by merely changing tool bits.



(Left) *The G. & L. Continuous Feed Facing and Boring Head with main spindle of the machine extended through the hardened steel bushing of the attachment.*

● Internal boring, facing and counter-boring in open or blind holes where bores are larger than openings, are easily performed on G. & L. Boring Mills, equipped with the G. & L. Continuous Feed Facing and Boring Head. In this particular installation, the manufacturer was confronted with the problem of boring intricate valve bodies with many external and internal machining operations. His G. & L. Table Type Machine, equipped with a 26″ diameter Continuous Feed Facing and Boring Head, makes it possible for him to perform all of these operations on one machine. Since the spindle extends through the facing head, the facing head need not be removed for milling, drilling, or boring operations which require the tools or boring bars to be mounted directly in the morse taper of the spindle.

Perhaps you have unusual jobs for your horizontal boring, drilling and milling machine that can be simplified with this attachment. The five features described at right make for easy, rapid adjustment and operation. In addition, this unusual design and construction makes it possible to perform many operations and combinations of operations not ordinarily performed with a horizontal boring, drilling and milling machine. On occasion, it has been used for threading, and can be used for boring and facing simultaneously.

A wide range of standard tools is available for use with this attachment. Special tools can be designed and built for specific applications.

1. **Tool Slide**—Has six separate power feeds ranging from .009″ to .118″ per revolution of head.
2. **Feed Selector** — Control is provided for selection of any one of six feeds.
3. **Directional Control** — Lever points in direction of tool slide feed.
4. **Micrometer Adjustment**—Graduated to .001″ for tool slide adjustment.
5. **Two Tool Holders** with ¾″ tool bits furnished as standard equipment.

. . . Reduce Settings and Save Time *with this* G. & L. Continuous Feed Facing & Boring Head . . .

Additional Data covering the complete line of Giddings and Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin No. TE 34.

GIDDINGS & LEWIS MACHINE TOOL CO.

132 DOTY STREET, FOND DU LAC, WISCONSIN

36 HOLES in Propeller Blade Bushing *held to* ACCURACY *of* ±.0005" *with* HIGH FINISH

e) All dimensions in boring the 36 high-holes in these Bronze ller Blade Bushings ild to ±.0005".

STOKERUNIT SIMPLEX PRECISION BORING MACHINE

Precision Bores Each Hole in 16 Seconds

A widely known manufacturer of airplane propeller parts is regularly using a battery of Stokerunit Simplex Precision Boring Machines to insure superior finish and precision accuracy in critical boring operations.

In the production of these alloy bronze propeller blade bushings, for example, an extremely fine finish with close tolerances is required in finish boring the 36 holes in the flange. All dimensions—roundness of hole, dimensions between holes and distance from center of bushing—are uniformly held to ±.0005".

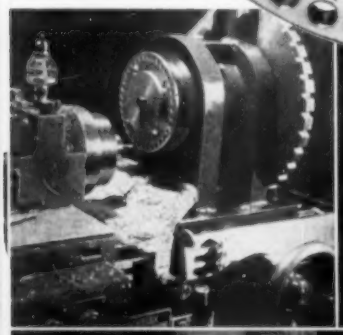
PRECISION ACCURACY AND FINE FINISH MAINTAINED IN PRODUCTION

In this setup, the Stokerunit Simplex Precision Boring Machine bores one hole at a time every 16 seconds in alloy bronze bushings—hardness 90-100 Rockwell. Hole is .3125" in dia. ±.0005" by 1/4" deep. Work slide is equipped with constant reciprocating feed, and indexing is done by hand when work is clear of tool. Feed is 4 7/8" per minute; spindle speed 1750 r.p.m. Every rigid requirement of accuracy and finish is consistently maintained.

VERSATILITY—Stokerunit Simplex Precision Boring Machines can be adapted to a multiplicity of precision boring operations—for either short-run or production work. They can be furnished with single or multiple spindles, depending upon your requirements. Over 25 models are available in both mechanical and hydraulic feeds and cover practically the entire range of precision boring applications.

Profit with precision accuracy, finer finish and increased production in your precision boring operations. Consult our engineers for a study of your parts and production problems.

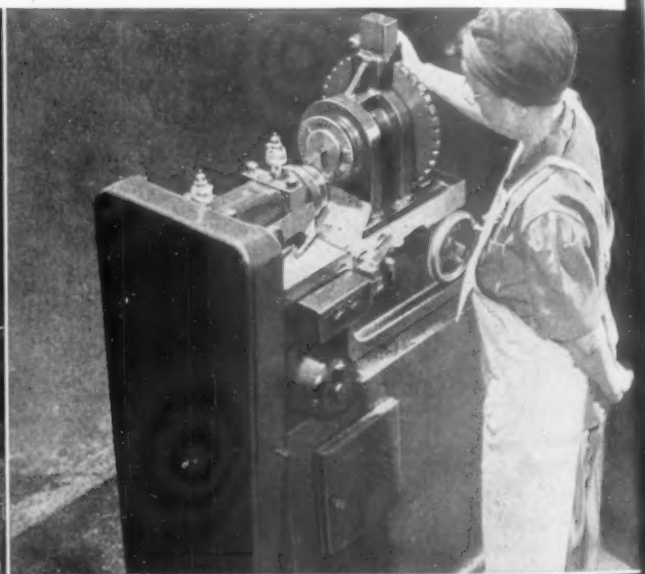
For specific recommendations, send blueprints of parts with production requirements. No obligation.



(Left) One hole at a time is precision bored every 16 seconds.

(Right) The Simplex maintains precision accuracy and fine finish in production.

(Below) Partial view of battery of Stokerunit Simplex Precision Boring Machines in plant producing airplane propeller parts.



BULLETINS with Complete Data!

Write today for these two booklets covering our entire line of Simplex Precision Boring Machines. Full details and specifications of each type are included.

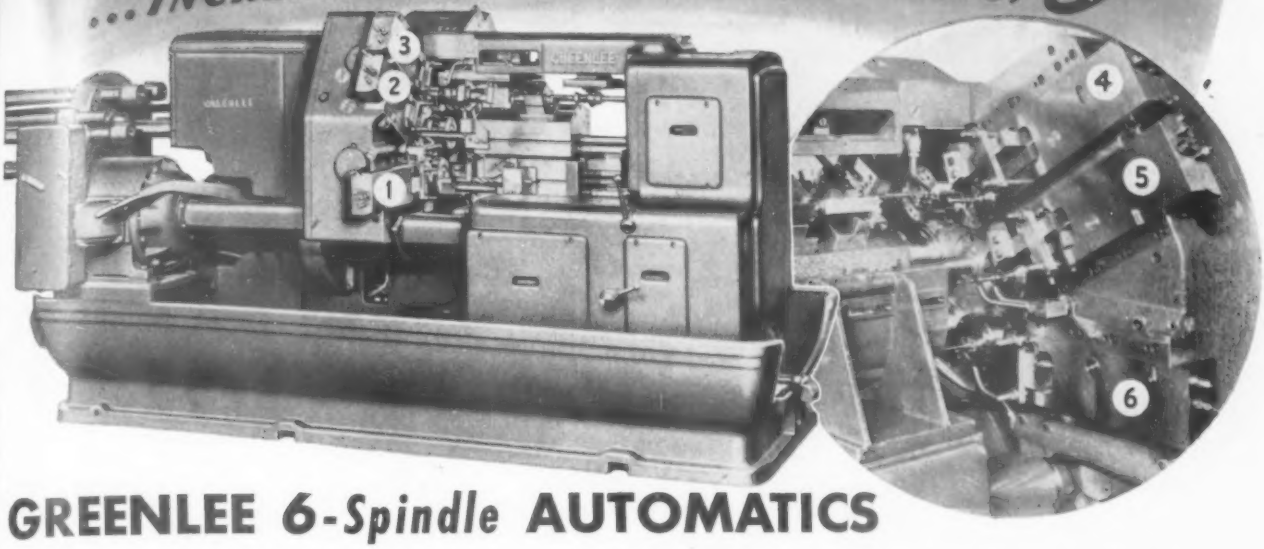
STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHI

4528 WEST MITCHELL STREET • MILWAUKEE, WISCONSIN

Flexible Capacity

...INCREASES PRODUCTION EFFICIENCY



GREENLEE 6-*Spindle* AUTOMATICS

CROSS-SLIDE OPERATIONS	POS. NO. 1	POS. NO. 2	POS. NO. 3	POS. NO. 4	POS. NO. 5	POS. NO. 6
Forming	√	√	√	√	√	√ †
Form Turning	√	√	√	√	√	√ †
Shaving	√	√	√	√	√	√ †
Skiving	√	√	√	√	√	√ †
Stenciling	√	√	√	√	√	√ †
Knurling	√	√	√	√	√	√ †
Wide Form Knurling	√	√	√	√	√	√ †
Facing	√	√	√	√	√	√ †
Burnishing	√	√	√	√	√	√ †
Thread Rolling	√	√	√	√	√	√ †
Under Cutting			√	√		
*Cut-Off	√	√	√	√	√	√
END-WORKING OPERATIONS						
Threading			√	√	√	√
Tapping			√	√	√	√
Reaming			√	√	√	√
Drilling	Any	Position	Except	Cut-Off		
High-Speed Drilling	"	"	"	"	"	"
Boring	"	"	"	"	"	"
Eccentric Boring	"	"	"	"	"	"
Facing	"	"	"	"	"	"
Burnishing	"	"	"	"	"	"
Recessing	"	"	"	"	"	"
Chamfering	"	"	"	"	"	"
Milling	"	"	"	"	"	"
Roller Turning	"	"	"	"	"	"

† Only when not used as cut-off position.

* Cut-off cannot be combined with another operation on the same cross slide. Position may be varied to produce two or more parts simultaneously.

● With a minimum of down-time, hundreds of Greenlee 6-Spindle Automatics are today busy turning out millions of screw machine parts for the United Nations. An important factor termed "flexible capacity" is largely responsible for their high efficiency on a wide range of jobs, large or small. The *flexibility* of the Greenlee Six, for instance, makes possible fast alterations in set-ups and quick changes in tooling adjustments. Its *capacity* handles a wide range of operations. This is a vital factor today in meeting the ever-changing requirements of war . . . will be more important tomorrow in dealing with post-war economy.

The flexible capacity of the Greenlee 6 handles with ease all of the 23 operations shown at left at any of the spindle positions indicated. Thus, the sequence of operations are more easily arranged and synchronized to provide a high rate of efficiency on a wide variety of jobs.

Write for more information—get complete details on the flexible capacity of Greenlee 6 Spindle Automatics.

GREENLEE BROS. & CO.

1943 MASON AVE., ROCKFORD, ILL.

BUILDERS OF THE FAMOUS MULTI-STATION AUTOMATIC TRANSFER MACHINE FOR MASS PRODUCTION OF AIRCRAFT CYLINDER HEADS

GREENLEE *Automatic Screw Machines*

More Accurate Internal Finishes

in Less Time at a Lower Cost–With the Sunnen Precision Honing Machine

This popular, low-cost machine is guaranteed to hone internal cylindrical surfaces to within .0001" and produce a super-smooth finish of 2 to 3 micro-inches. In actual practice, *accuracy has been held to within .000025" on production jobs.*

In addition, production has been increased — *in some instances up to 500%* — with fewer rejects and absolute interchangeability of parts. These advantages not only speed production but prevent waste of vital war materials and costly man-hours of production!

Consider These Advantages, Too

Wide range — the Sunnen Precision Honing Machine handles internal diameters from .185" to 2.625". Relieves big internal grinders for other jobs. Corrects errors of out-of-roundness or taper caused by previous operations. Facilitates duplication of sizes. Does not require skilled labor. Practical — inexpensive — economical to operate.

Write for free bulletin—or ask a Sunnen Engineer to give you complete information on how Sunnen Honing can be put to work in your plant.

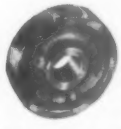
Typical Jobs

Cast Iron Valve Stem Guide. ½ to one thousandth removed —220 pieces per hour. Better finish and straighter hole.

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Idle Valve Guide. Honing after grinding holds a .0002" limit necessary for accurate idling.

Shell Loading Die.



Aircraft Valve Tappet Roller. Honed after grinding to give 100% bearing surface.

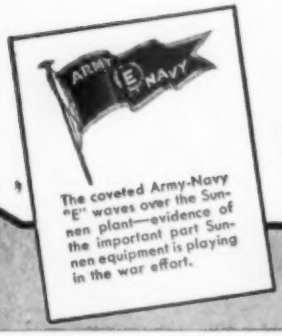
Hydraulic Control Bushing. Honing gives straight round hole after rough reaming.

Aircraft Carbureter Operating Valve Sleeve. Sunnen honing eliminates distortion from assembling operation.

Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Compressor Yoke. Alignment maintained and better finish produced.

Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two holes.



The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

Bearing. A very small part. 2 micro-inch finish necessary.

Carbureter Idler Pump. Smooth, straight-line finish in blind hole prevents piston leakage.

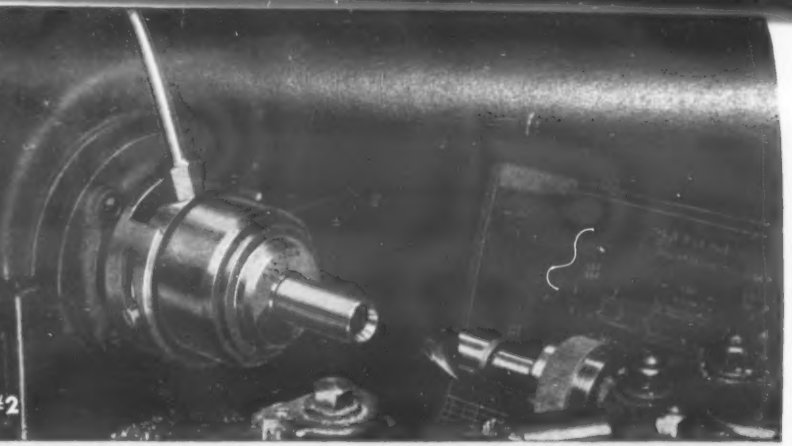
Ceramic Insulator. Honing used to eliminate roughness inside ceramic tube.

SUNNEN

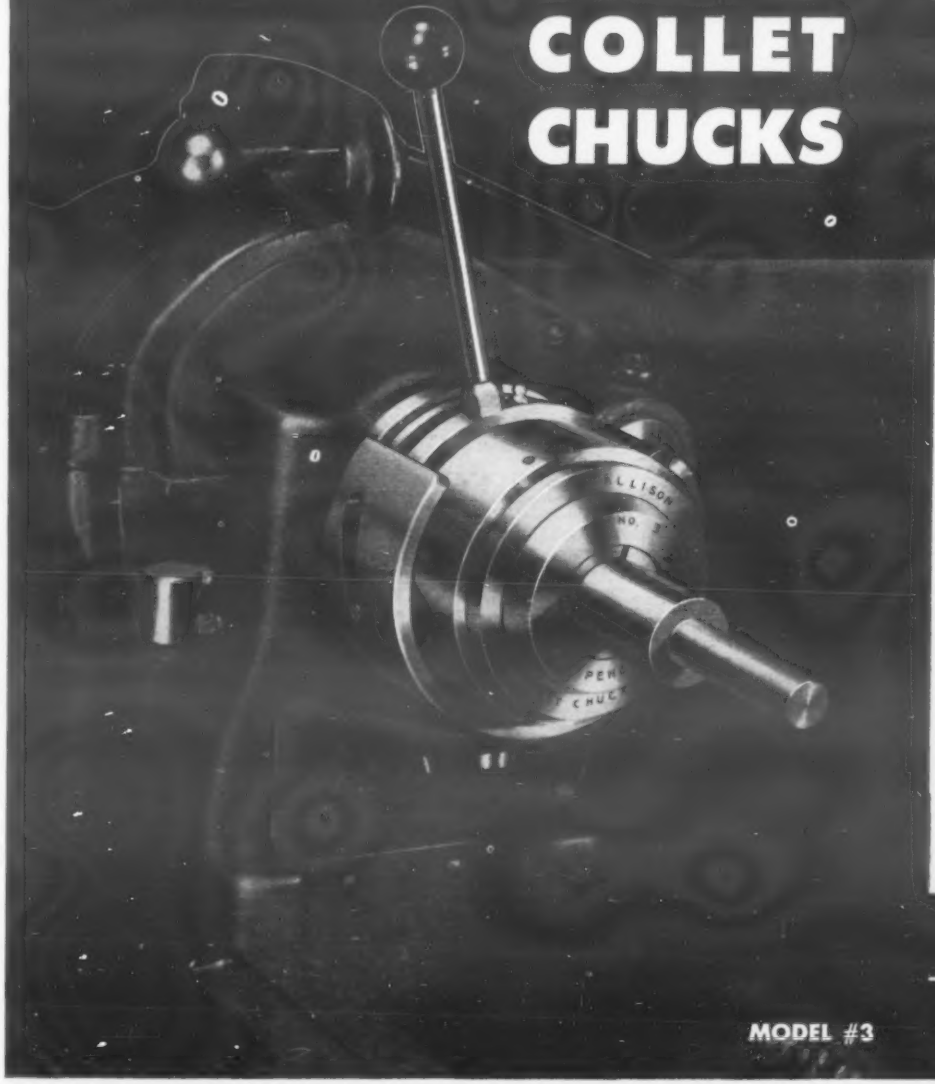
SUNNEN PRODUCTS COMPANY 7941 Manchester Ave., St. Louis, Mo.

Canadian Factory, Chatham, Ontario

TWO NEW Allison COLLET CHUCKS



MODEL #2



MODEL #3

TWO NEW DESIGNS AND SIZES—HERE'S WHY! There are no pins, wedges or dogs, no limit on operating speeds, no stock slippage. A new short handle operating a full circle cam gives correct even pressure when working either hard or soft materials. There's no awkward reaching for handle — a short pull toward operator tightens collet—a push away from operator releases it. Convenient and safe for women operators. All Allison Collet Chucks are of solid steel construction, hardened and ground to insure against wear — and to maintain accuracy in production.

MODEL #2—For 1 ½" 8-thread spindle lathes—with ⅞" collet capacity uses same collets as in the #1 model Allison Chuck.

MODEL #3—For 2 ½" spindles and under—with 1 ⅝" collet capacity.

Write for the new Allison catalogue or SEE YOUR LOCAL DISTRIBUTOR

Allison TOOL AND ENGINEERING CO.

4031 WHITTIER BOULEVARD • LOS ANGELES 23, CALIFORNIA

THE VITAL TENTH

One ten-thousandth of an inch is a minute unit of measurement; —so small that it seems insignificant to the average layman. And it isn't essential in the fitting of a drive of a locomotive.

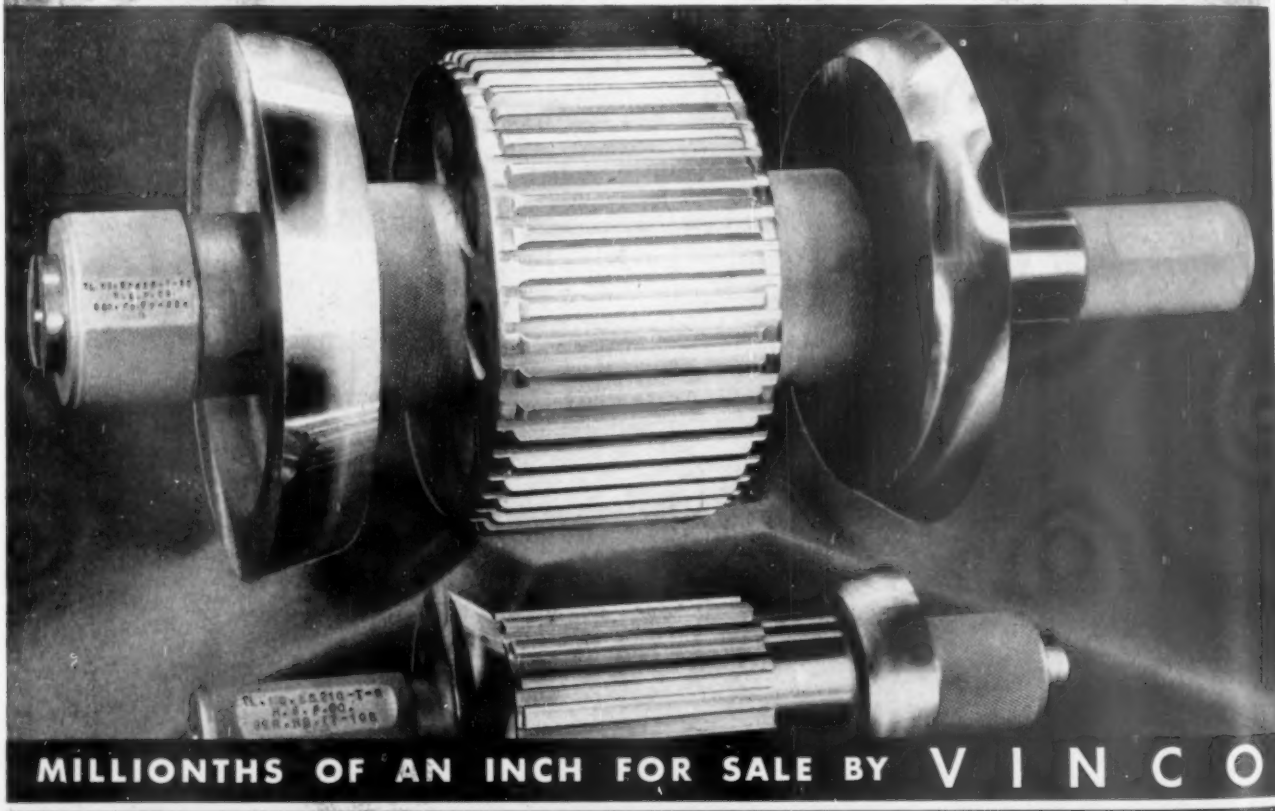
But it is most important to the boys who service or fly the high-powered airplanes of today—the fighters and bombers that are doing such a tremendous job of breaking the back of the Axis—these boys know how vital that last ten-thousandth of an inch can be. For example, it permits an almost invisible sloppiness or play in the fitting of a propeller to the splines of the drive shaft and this play, with the great power of the engine behind it, can cause serious vibrations which shorten the life of the entire plane by hours.

In the midst of a dog-fight or a bombing mission over Berlin or Rabaul, vibrations of this type, however small, can cost the lives of our fliers and the loss of our planes.

Vinco is one of the few precision gage makers who can produce checking gages and balancing arbors which are satisfactory to the aviation industry. The "vital tenth" is carefully controlled through every operation in the making of these gages.

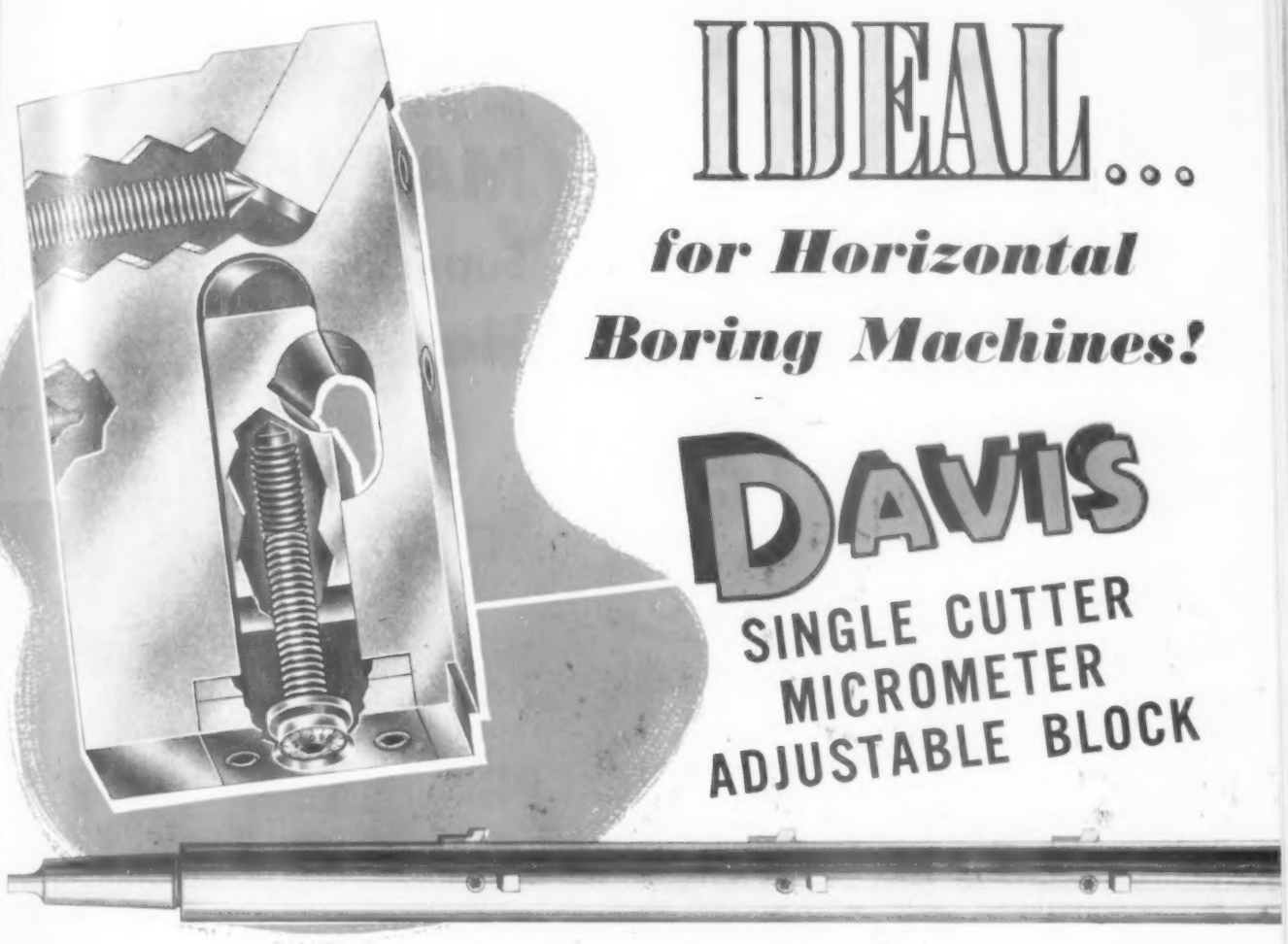
Vinco's reputation in the making of precision gages has been honestly won during the past quarter century and today, top quality precision gages and Vinco are synonymous. Write for literature.

VINCO CORPORATION, 8855 SCHAEFER HIGH'Y, DETROIT 27, MICH.
SALES OFFICES: • • • • NEW YORK AND CHICAGO



MILLIONTHS OF AN INCH FOR SALE BY VINCO

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.



IDEAL...

for Horizontal Boring Machines!

DAVIS

SINGLE CUTTER MICROMETER ADJUSTABLE BLOCK

This time-tested DAVIS Block is designed chiefly for line boring bar practice, where rigidity and a wide range of cutter adjustments are the main requisites.

The DAVIS *Single Cutter Micrometer Adjustable Block Provides:*

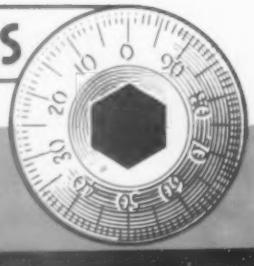
1. Suitable size blocks and cutters with wide range of adjustment. Furnished in sizes from 2½" to 17".
2. Exclusive and accurate means of adjusting and setting cutters to size. Adjustable in .001 of an inch.
3. Block and cutter adjust as a unit, insuring full cutter support at all settings.

Write Today for Descriptive Bulletin No. 600

This DAVIS block provides an efficient and economical set-up for rough, semi-finish and finish boring, also special undercutting and forming operations. It is also suitable for use in Davis bars with standard-sized block slots.

Davis Boring Bars designed specially for customers requirements.

DAVIS
BORING TOOLS



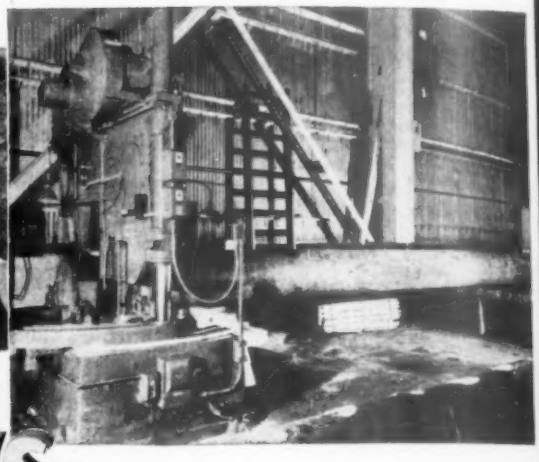
DAVIS BORING TOOL DIVISION
JARKIN PACKER COMPANY, INC., ST. LOUIS, MO.

The MARVEL of the Year----
the new

MARVEL No. 24

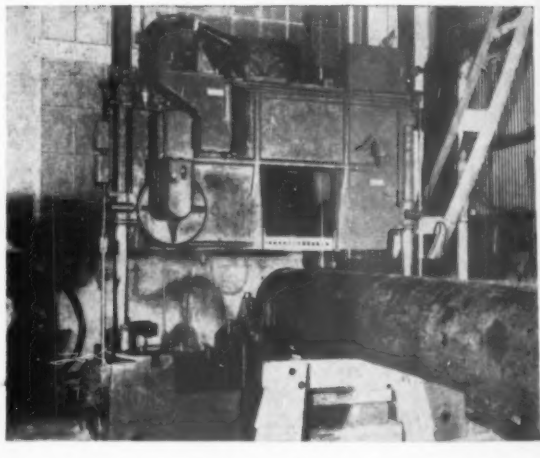
Super-Giant Hydraulic Hack Saw

—Capacity 24" x 24"



The Hack Saw has grown up again! And now you can cut off large billets, forgings, die blocks, etc., up to 24 inch round or square, with the same degree of economy you cut off smaller size work. Yes, the new No. 24 MARVEL is actually a "hack saw", in spite of its mammoth size, since it employs a reciprocating blade. Of course, it uses a much larger hack saw blade than any heretofore available (36" long, 4½" wide, ⅛" thick); but it's still an "inexpensive hack saw blade" compared to the cost of large capacity circular cold saw blades. And, because this hack saw blade is comparatively inexpensive, users of the new giant No. 24 MARVEL machine will not hesitate or worry over cutting off the modern tough alloys in big sizes—a problem that has caused so many headaches where only circular cold saws were available for such large work.

The photos shown were taken at the Mesta Machine Co., Homestead, Pa.—one of the finest-equipped and most modern "heavy" machine shops in the world. The machine is shown cutting off a gigantic 24" round forging. Mesta now has three identical No. 24 MARVEL machines which are doing a fine cutting-off job on all sorts of large size alloys, faster and cheaper, without "fuss" or the nerve-racking howling and groaning of their previous circular saw methods.



How big is this machine? Judge from the man i
the photo. Its weight, 16,000 pounds—8 tons
Twice the weight of the No. 18 MARVEL heretofore the world's largest hack saw!
This giant saw bears no resemblance to an
"small size" hack saw; it follows the modern
basic, exclusively "big saw" design of th
No. 18 MARVEL.

Write for Catalog showing complete line of MARVEL Saws.

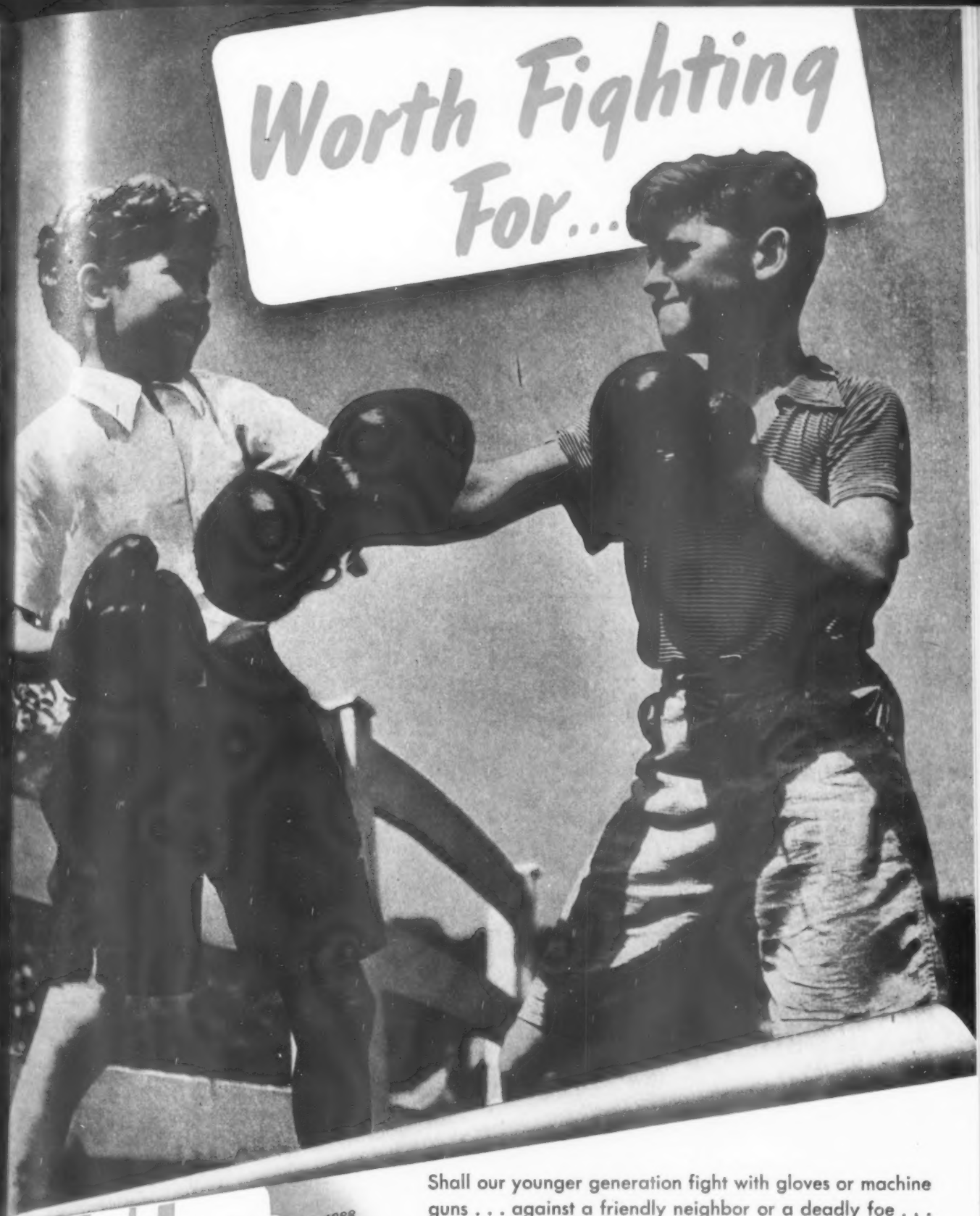
BUY FROM YOUR LOCAL DISTRIBUTOR

ARMSTRONG-BLUM MANUFACTURING CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE. **CHICAGO 39, U.S.A**

Eastern Sales Office: **225 Lafayette St., New York 12, N.Y**



Precision Built Milling Machines Since 1888

KEMPSMITH

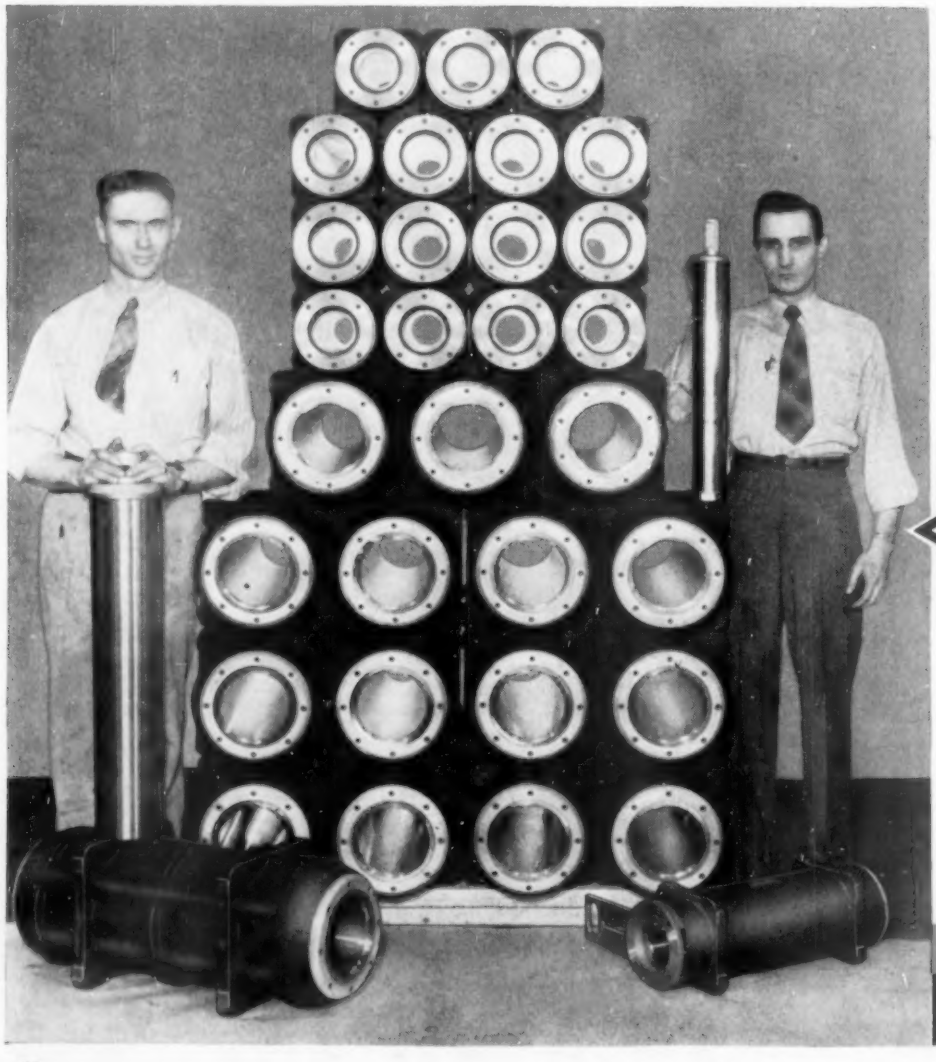
KEMPSMITH MACHINE COMPANY • MILWAUKEE 14, WIS., U. S. A.

Shall our younger generation fight with gloves or machine guns . . . against a friendly neighbor or a deadly foe . . . in peaceful, back-yard surroundings or in blood-drenched battle fields? The answer depends on what YOU and I do on the production front. We must CONTINUE to produce vitally needed war equipment and supplies . . . in ever increasing amounts . . . to help the United Nations win the War. We dare not let them down. We must

STAY ON THE JOB!

WRITE for Details About Our Complete Line of Cartridge Case Inspection Gages

Shown below are typical "Quality" Maximum Profile Chamber Gages now in the service of our Country. Each of the 32 gages must exactly fit the proper master checking plug.



● We are prepared to supply producers of ordnance materiel with gages of all sizes—from the largest to the smallest, either empty case or complete rounds. You are invited to write for our STANDARD LIST PRICES on: 20 MM, 37 MM, 40 MM, 57 MM, 75 MM, 76 MM, 90 MM, and 105 MM sizes. Other sizes quoted on request.

EST. 1929
QUALITY TOOL AND DIE CO.
REG. U. S. PAT. OFF.

405 N. Noble Street
INDIANAPOLIS 2, IND.

★

Manufacturers of
"QUALITY" Products

ARMY NAVY

Speed Victory . . .

BUY WAR BONDS

Grinding mills used to reduce ore to appropriate size for treatment

NICKEL AIDS THE MINING INDUSTRY

to KEEP 'EM PRODUCING!

Weapons for war get their start underground.

And it's modern mining machinery that speeds 'em on their first step to Berlin and Tokio.

Through research and development work in the pre-war years, manufacturers have pioneered many innovations that make today's mining equipment amazingly efficient.

And in this war emergency, the industry is making the most of that equipment... working it harder, longer, often beyond rated capacity ... spurred on by the limitless demands of war.

One reason the equipment holds up so well ... thanks to the foresight of design engineers... is that many of the critical parts are made of Nickel alloyed materials.

Nickel goes a long way to make those parts longer-lasting and more dependable ... tougher, stronger, more resistant to corrosion.

Hence, the use of Nickel is now so widespread that Nickel Alloys fortify nearly all kinds of mining and milling equipment parts ... from drill bits and crusher frames to skips and cages, from ball mill liners to mine car axles.

Throughout the years of research and planning behind this progress, it was our privilege to cooperate with the engineers who desired help in the selection, fabrication, and heat treatment of alloys. Whatever *your* industry may be ... if you'd like to have such assistance ... counsel and printed data are available on request.

New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects — from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

★ *Nickel* ★

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

For Your Carbide Tools . . .

Three Types of NORTON GRINDING WHEELS

There are three types of Norton wheels for grinding the cemented carbides. Each has its field. For example:

1. **Metal bonded diamond wheels** for the offhand grinding of single point cemented carbide tools.
2. **Resinoid bonded diamond wheels** for sharpening multi-blade carbide tools such as milling cutters and the like.
3. **Crystolon vitrified wheels** for many roughing operations and for plants doing only a limited amount of carbide grinding.

Norton abrasive engineers are familiar with all three types and their proper application. To obtain their help contact direct or through your Norton distributor.

NORTON COMPANY, WORCESTER 6, MASS.
Distributors in All Principal Cities

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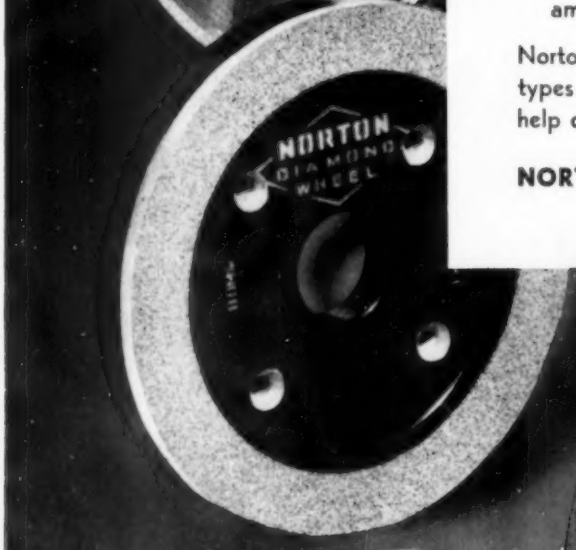
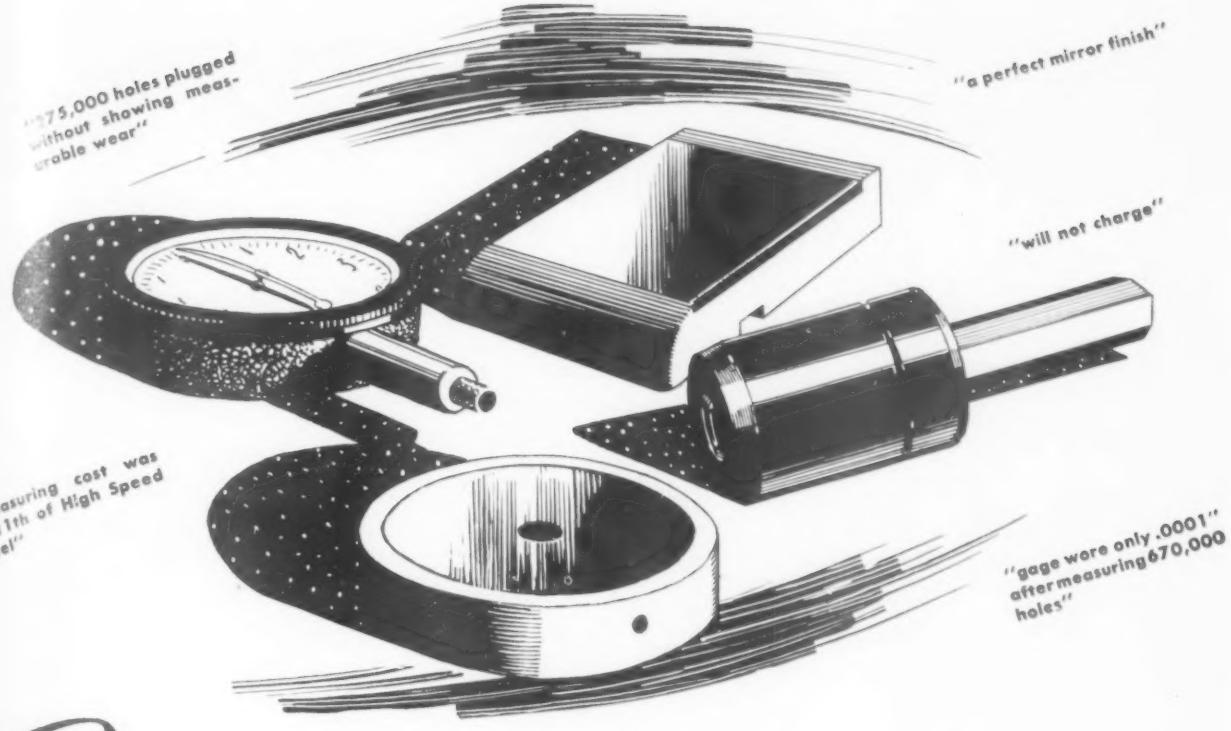


NORTON ABRASIVES


"275,000 holes plugged without showing measurable wear"
"a perfect mirror finish"
"will not charge"
"measuring cost was 1/11th of High Speed Steel"
"gage wore only .0001" after measuring 670,000 holes"

Boron carbide does it

Boron carbide is the answer to an inspector's prayer. Here, is the perfect tipping material for contact points, anvils, surface plates, plug gages, etc. Here, is the material that is making outstanding records for economy, accuracy and wearability.

Boron is non-metallic, therefore it will not charge. It will not pick up lint, dust or metal particles—those common trouble makers which often scratch the work being inspected.

Add to boron's characteristics the fact that New England products, tipped with this modern material, possess a finish and accuracy as fine as modern science can produce.

Take advantage of New England's experience in producing thousands of boron tipped parts—send the coupon today for details, or, better still, send prints of your wear parts that can be improved with the use of New England boron tips.

NE TRADE MARK

ALL KINDS OF CARBIDE PRODUCTS • DIAMOND TOOLS • DIAMOND POWDER

NEW ENGLAND
CARBIDE TOOL CO.
60 Brookline Street
Cambridge, Mass.

Please send me folder covering the New England line of tungsten carbide, boron carbide and diamond contact points and anvils.

NAME_____ TITLE_____

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A. M.

"Speaking of Tenths"

The war is teaching industry new standards of precision—precision that will be required when peace comes. It is precision to tenths—

"1/10 of 1/1000 of an inch"

The extreme accuracy of *Cleereman* Jig Borers has helped establish the new standards of precision. They will help produce, along with Cleereman Drilling Machines, the finer, more accurate products demanded after the war.

BRYANT MACHINERY & ENGINEERING COMPANY

Associated with **CLEEREMAN MACHINE TOOL COMPANY**

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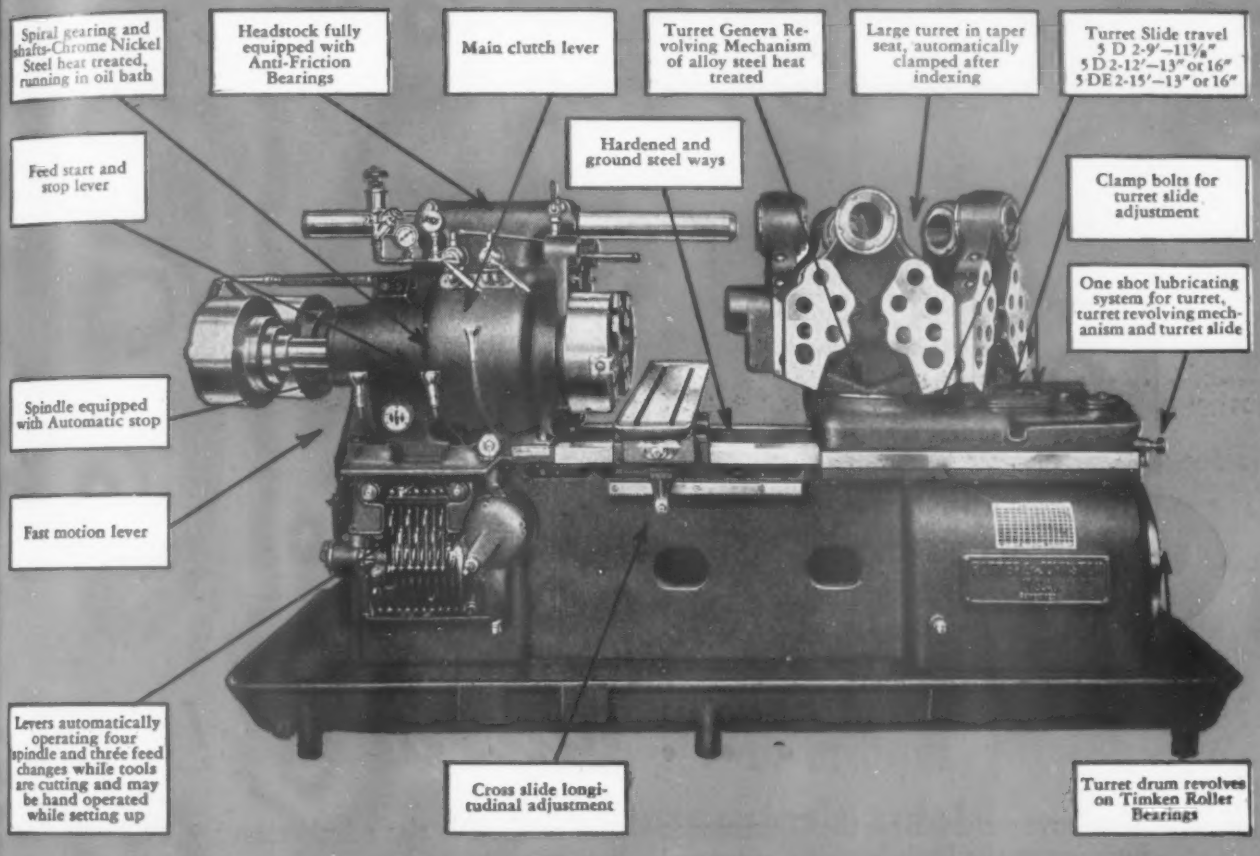

Spiral gearing and shafts-Chrome Nickel Steel heat treated, running in oil bath
Headstock fully equipped with Anti-Friction Bearings
Main clutch lever
Turret Geneva Revolving Mechanism of alloy steel heat treated
Large turret in taper seat, automatically clamped after indexing
Turret Slide travel 5 D 2-9′—11⅜″ 5 D 2-12′—13″ or 16″ 5 DE 2-15′—13″ or 16″
Feed start and stop lever
Hardened and ground steel ways
Clamp bolts for turret slide adjustment
One shot lubricating system for turret, turret revolving mechanism and turret slide
Spindle equipped with Automatic stop
Fast motion lever
Levers automatically operating four spindle and three feed changes while tools are cutting and may be hand operated while setting up
Cross slide longitudinal adjustment
Turret drum revolves on Timken Roller Bearings

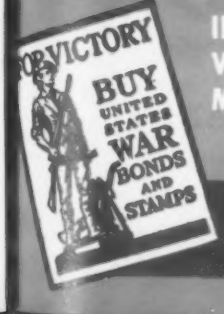
The 2-SPINDLE POWER-FLEX *Automatic Chucking Machine*

utstanding Output . . . at
w Production Cost . . .

Note the features of this powerful, convenient highly accurate, highly productive machine. Many records of performance disclose output of duplicate parts within its range greatly in excess of that from a single spindle unit.

The 2-spindle POWER-FLEX, designed to meet specific shop conditions, makes it possible to perform an operation on two subjects simultaneously, or when cuts involved are sufficiently in balance, it is possible to handle one operation on one subject and supplementary work at the same time on another subject. For a given output, the two-spindle POWER-FLEX offers lower first cost, power savings and conservation of floor space when compared with two single spindle machines.

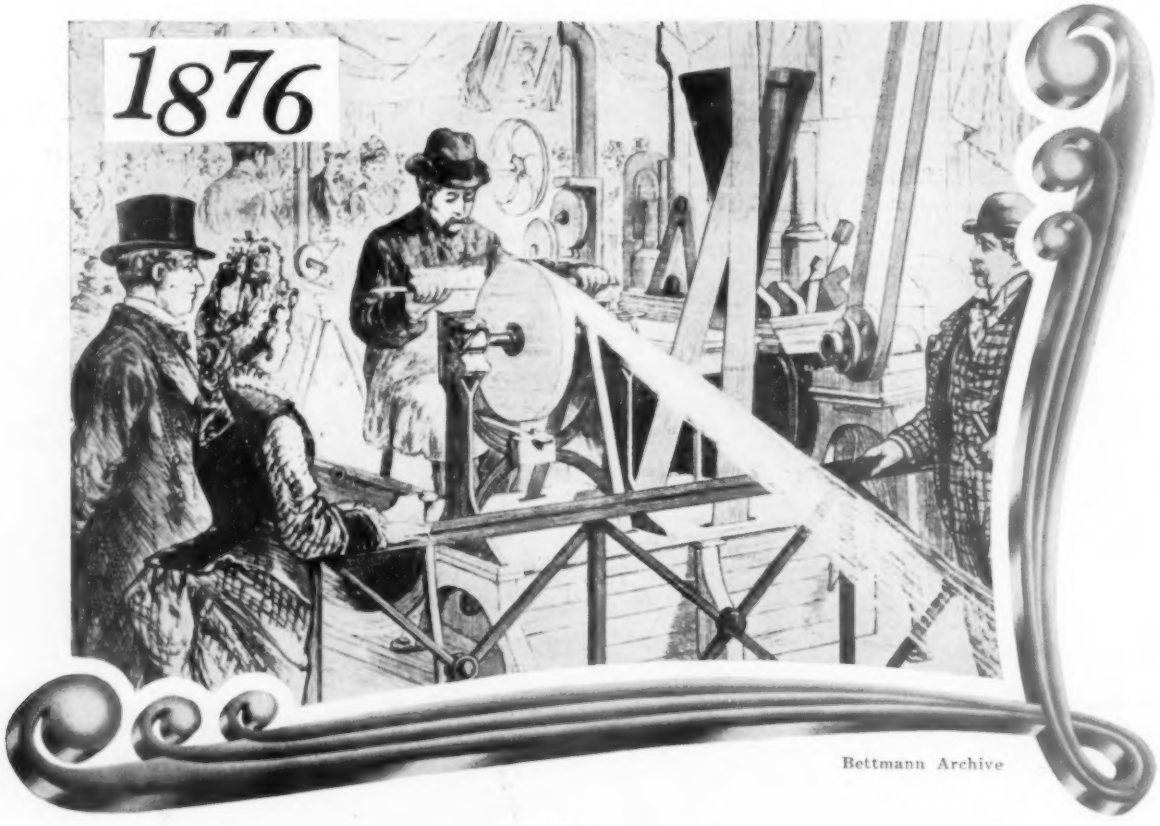
Bulletin 111 gives complete details. Ask for your copy.



INVEST IN AN EARLY VICTORY BY BUYING MORE WAR BONDS NOW!

The POTTER & JOHNSTON MACHINE CO., PAWTUCKET, R.I.

A "Production Miracle" in the Days of the Philadelphia Centennial Exposition



Bettmann Archive

. . . but today!

THE above scene is from the Government Building at the Philadelphia Centennial Exposition in 1876. Entitled "Miracles of Modern Grinding," it shows the method used in burnishing bayonets. Yes, indeed, this was a "production miracle" for those days. But compared with the standards of today, there just was no such thing as production. Note the work being held by hand. Perhaps the greatest single improvement over the old method is the advancement in the use of air and hydraulics . . . the application of air or hydraulic pressure for the operation of chucks, work holding and ejecting devices, assembling presses and many other labor-saving devices.

* * *

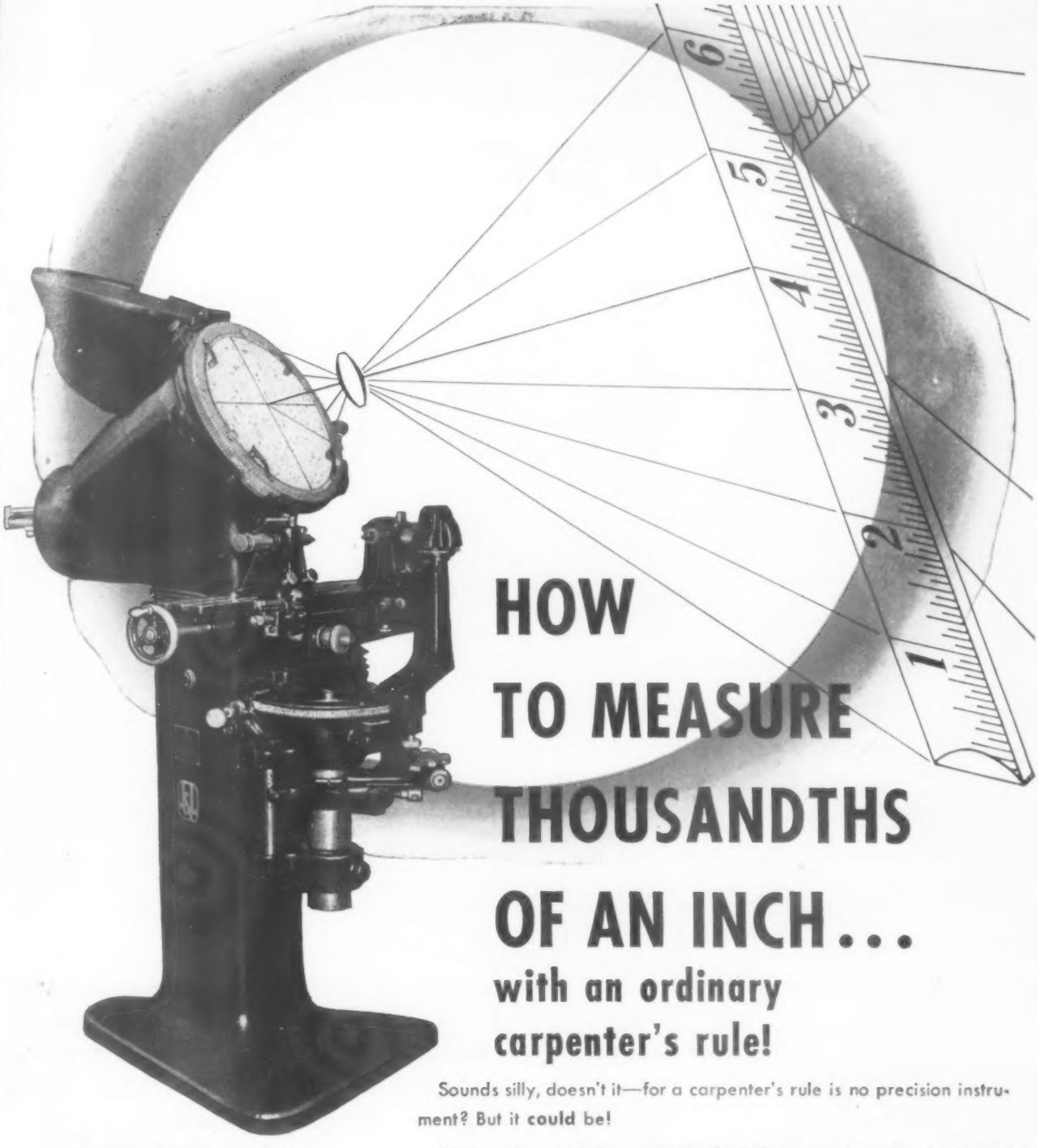
Let "LOGAN" Engineers make recommendations on modernizing your plant with the application of "LOGAN" *Air* and *Hydraulic Equipment.*

"LOGAN"

LOGANSPORT MACHINE CO., INC.

902 PAYSON ROAD LOGANSPORT, INDIANA

Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories



HOW TO MEASURE THOUSANDTHS OF AN INCH...

with an ordinary carpenter's rule!

Sounds silly, doesn't it—for a carpenter's rule is no precision instrument? But it **could** be!

With a **Jones & Lamson Optical Comparator,** the shadow of a small metal part measuring .001" projected at 62½ magnifications would appear on the screen 1/16" thick and **could** be measured with an ordinary carpenter's rule.

Of course we do not suggest the use of a carpenter's rule in your inspection department. But you can use a technique as simple as this.

We'll be glad to help you. Send samples and blueprints to Jones & Lamson Machine Company, Springfield, Vermont.

JONES & LAMSON
MACHINE COMPANY
SPRINGFIELD, VT. U. S. A.

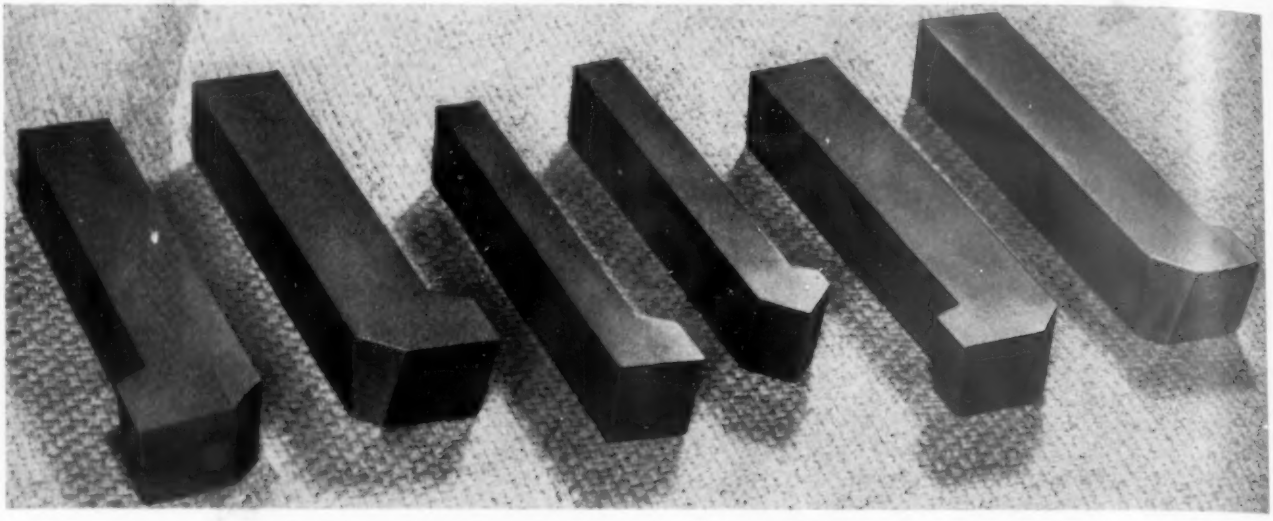
OPTICAL COMPARATORS

PROFIT-PRODUCING MACHINE TOOLS

For rapid, economical inspection . . . BEYOND A SHADOW OF A DOUBT!

Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies

Prove their Superiority By this FREE TRIAL!



Several hundred machine shops engaged in important war work are demonstrating every day that Victory Tool Shanks with cemented carbide tips out perform and outlast high-speed steel tools.

We invite you to prove the truth of this statement for yourself, by a trial in your own shop.

HERE'S HOW:

Write for our Bulletin No. 53T-2 which illustrates standard shapes and sizes of Victory Tool Shanks stocked for immediate shipment. Pick out two or three that you can use. Ask for them for free trial. We'll ship at once and let you be the judqe.

You, too, will find that these tough Meehanite Shanks work better and last longer than steel, and cost you less.

THE Cooper-Bessemer CORPORATION

DEPT. E., MOUNT VERNON, OHIO

New!

Ozalid Rapid Black

What the Reproduction World has been waiting for!

Never before has there been a dry developing paper like OZALID RAPID BLACK.

You'll be convinced of this when you try it in your Ozalid Whiteprint Machine.

You can use RAPID BLACK with all your originals. You can operate your machine at top speeds . . . and these results are *guaranteed:*

1. . . . *"Quality" prints* from your pencil tracings.
2. . . . *closest facsimiles* of your typewritten material.
3. . . . *excellent reproductions* from positive film transparencies of your photographs.
4. . . . *exceptional contrast* between line detail and background—opaque *black* on a *new* white.

ACCEPT THIS FREE OFFER

Try new OZALID RAPID BLACK in your machine, using your originals. We'll gladly send you a package FREE.

P.S. —If you haven't an Ozalid machine, send for free printed samples . . . and our illustrated booklet which explains the Ozalid Process.

OZALID PRODUCTS DIVISION
GENERAL ANILINE & FILM CORPORATION
Johnson City, N. Y.

Gentlemen:

☐ Send a FREE package of your new paper, OZALID RAPID BLACK, for use in our Ozalid machine.

☐ Send printed samples and a copy of SIMPLIFIED PRINTMAKING.

Name_____

Company_____ Title_____

Address_____

Rehnberg-Jacobson
SPECIAL PRODUCTION MACHINE

FINISHES THE POINT ON A MACHINE GUN FIRING PIN

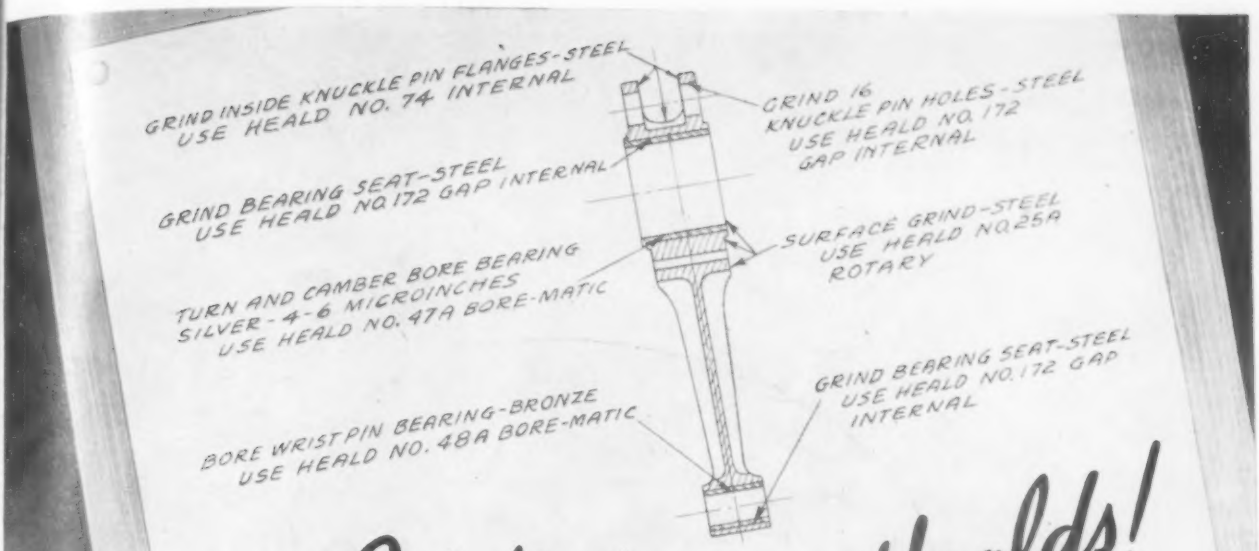
By hollow-milling this little 4/10-inch-long, carefully-shaped point on the firing pin for a .30-calibre machine gun, we were able to increase production 10 to 15 times over the previous method. Our machine, shown here, is a four-spindle vertical type with five-position automatic index. There are five special chucks on the index table, one for loading and the others for successive roughing and finishing operations. The spindle drive is obtained from one of our No. 45 Rehnberg Drill Units with a four-spindle head. Cam-controlled feed and rapid return is built into this head.

A "FUSSY" JOB...

The tolerances on this point are very close both as to size and shape, and fine finish is required. We designed our own precision cutting tools, precision holding means, and micrometer adjustments. The net result is a very smooth and accurate point, economically machined. *This is another example of how effectively our standard drill and index units can be used to make up a simple, efficient, special-purpose machine.*

REHNBERG R-J JACOBSON

REHNBERG-JACOBSON MANUFACTURING CO.
Special Machinery
2137 KISHWAUKEE ST. ROCKFORD, ILLINOIS



32 Operations Do them all on Healds!

32 Surfaces . . . Just two processes . . . borizing and grinding. Illustrative of these operations done on Heald Bore-Matics and Grinding Machines are those shown below.

Practically every working surface on this aircraft master rod is finished on Heald Precision Finishing Machines — all of the 32 surfaces indicated in the sketch above, in steel, bronze and silver.

All these 32 surfaces are finished by just two processes — *borizing* and *grinding*. These are the accepted methods for final finishing every type of surface — every kind of material — when ultra precision of dimension and surface are required. In some instances either method can be used. In other cases one of the two will produce materially better results.

Heald builds *both* precision borizing and precision grinding machines . . . consequently we can recommend, without bias, the machine that will best meet your requirements. Precision plus production will play an important role in postwar manufacturing . . . let us help you get both with the *right* machine for the job.

THE HEALD MACHINE CO., Worcester 6, Mass.

Contour boring silver master rod bearing on Heald No. 47A Bore-Matic.

Boring bronze wrist pin bearing in master rod on Heald No. 48A Bore-Matic.

Internal grinding 16 knuckle pin holes in master rod on Heald No. 172 Gap Internal.

Surface grinding shoulders and faces on master rod on Heald No. 25A Rotary.

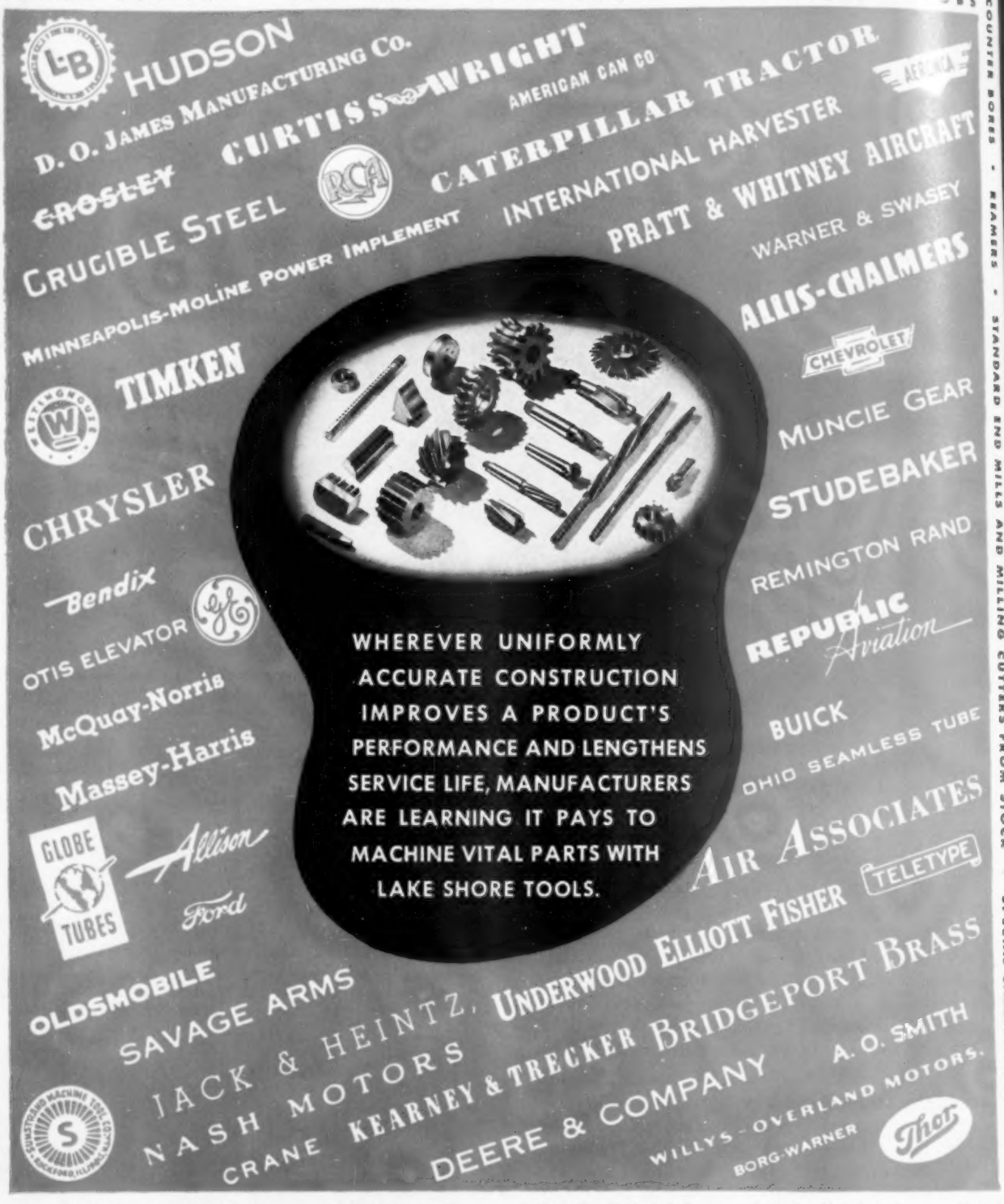
HEALD PRECISION FINISHING MACHINES

Borizing - Internal Grinding - Surface Grinding

MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS



MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

Back of every Lake Shore Tool are the facilities and skilled personnel of one of America's most completely equipped plants.

LAKE SHORE TOOL WORKS

Division of Carbide Tool Company

Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

816 NORTH KOSTNER AVENUE • CHICAGO 51, ILLINOIS

There's no substitute for EXPERIENCE!

Increased production attained in precision machining of this aircraft crankcase on the above Ex-Cell-O special-purpose machine.

Ex-Cell-O's wide experience in designing and building special machines to increase output and lower costs assures you practical advantages in your immediate or near future production

You have a substantial background of experience to draw from when you bring to Ex-Cell-O your problem in the *precision* machining of metal parts on a high production basis . . . whether it concerns an immediate war production job or a future product you are now planning. The more economical production of accurate metal parts necessitates single-purpose machines of improved efficiency, capable of giving greater output and reducing unit cost. For years Ex-Cell-O has been an acknowledged leader in the field of special-purpose machines . . . *precision* machines with exclusive features that represent the utmost in accuracy, production, operating ease, rigidity, and durability. This is why you should utilize Ex-Cell-O's experienced engineering and manufacturing facilities. Ex-Cell-O has representatives in all of the nation's principal manufacturing centers. Consult the one nearest you, or write to Ex-Cell-O Corporation Head Office in Detroit.

EX-CELL-O CORPORATION • DETROIT 6, MICH.

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

XLO

EX-CELL-O *for* PRECISION

How can machine tools avenge this

Dunkerque in America?

This is no enemy propaganda. No "usually well-informed sources" or Berlin broadcasts tell this tale. This is real . . . this is here . . . and this is defeat.

Our own private *peacetime* Dunkerque — in Arkansas, in New York, in West Virginia or California — in countless American "homes" where millions of people are ill-housed, ill-clothed, and bodily and mentally ill-fed.

What part will machine tools play in turning this kind of defeat into victory? The *whole* part, if the men of industry have the vision and the freedom to plan ahead, and to carry out what they plan.

If you are a manufacturer, there is one thing you can do at once: Have your production men and planners consult now with the engineers of the leading basic machine tool producers. They can help you in planning today your part in the peace that must be won after the war is won.

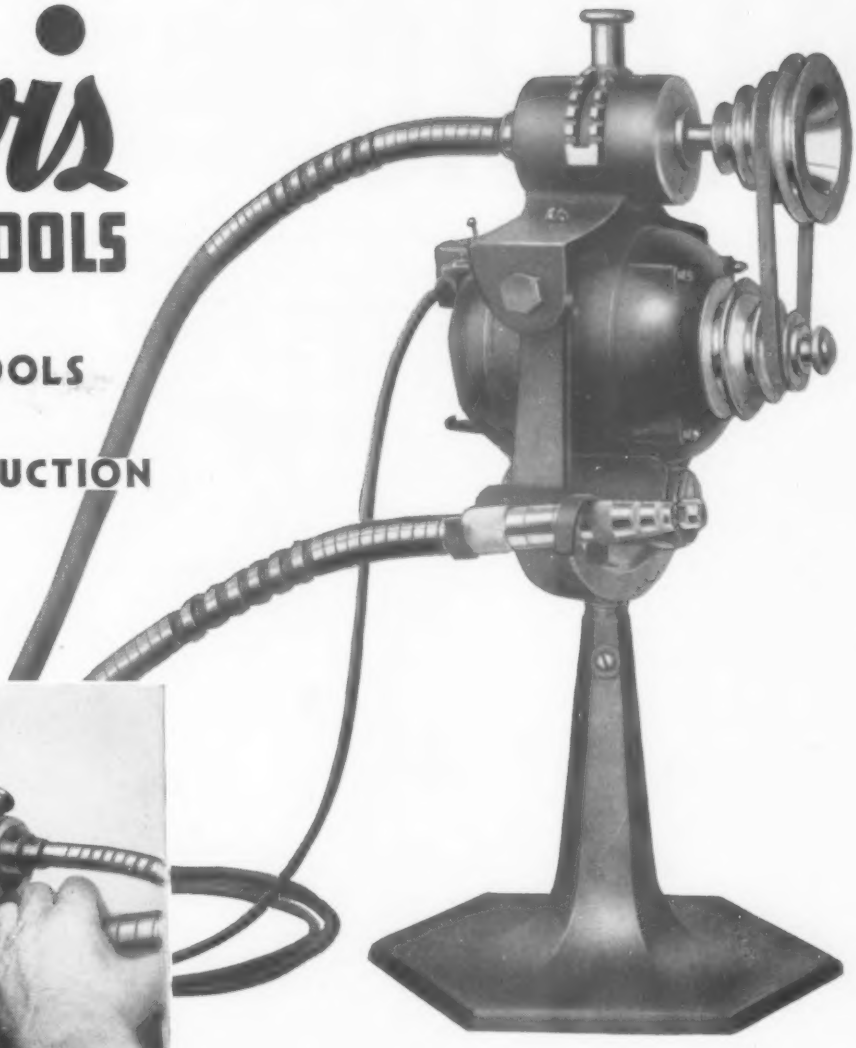
One of these is a Bryant man. . . . We invite you to send for him.

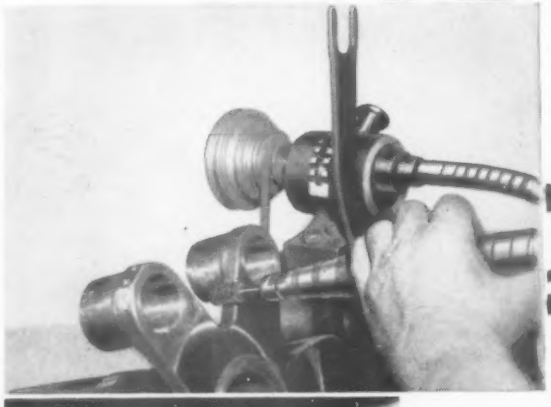
BRYANT

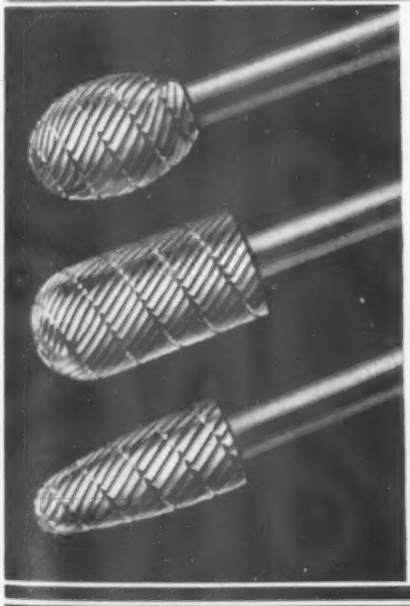
BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U. S. A.

Jarvis POWER TOOLS

HIGH SPEED TOOLS for HIGH SPEED PRODUCTION







Jarvis Flexible Shaft Machines

When used with correctly selected Jarvis Rotary Tools, these multiple-speed flexible shaft machines are the "power hands" of the metal working industry. They will perform many filing, grinding, sanding, buffing, brushing, cutting, and cleaning operations.

Jarvis Ground Rotary Files

The recognized standard in thousands of manufacturing plants for fast, efficient performance. Now furnished with Jarvis Hy-speed Case, increasing tool life an average of three times. Send your high-speed steel rotary files back to Jarvis for regrinding. They will be furnished with life prolonging Hy-speed Case.

Send for our new catalog MFTI

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

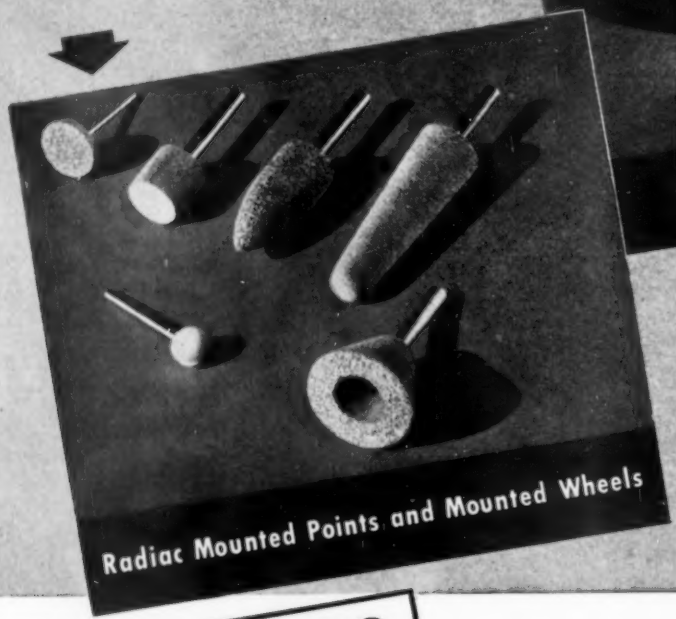
RADIAC*

MOUNTED POINTS, MOUNTED WHEELS AND INTERNAL GRINDING WHEELS ARE: PRESCRIPTION FITTED AND CUSTOM-COMPOUNDED

Every job is a special job for Radiac! The formula for every wheel is accurately prescribed for the job. And then the "prescription" is custom-compounded, and filed so that repeat orders can be filled to exactly the same specifications. When you buy Radiac you get the right wheel—every time!

All wheels and points are dressed and finished ready to use (no finishing, by you necessary). • All kiln glaze is removed. • All are 100% tested to precision tolerances. • Concentricity is guaranteed. • Special Bakelite cement secures wheel to mandrels. • Radiac Mounted Points and Mounted Wheels are available in tough, regular aluminum oxide (brown) or in special aluminum oxide (white or red bond) for greater friability.

Radiac Internal Grinding Wheels



Radiac Mounted Points and Mounted Wheels

All wheels are 100% tested to precision tolerances. • Each is a product of pioneers in the development of internal grinding wheels. • Radiac Internal Grinding Wheels are available in tough, regular aluminum oxide (brown); in special aluminum oxide (white or red bond) or a special exclusive "Blue Glass" friable bond which permits an increase in the ratio of cutting grain to bond.

PIONEERS
in the development of mounted points, mounted wheels, and internal grinding wheels.

Radiac POR-OS-WAY— Radiac PARAFLEX —Radiac Mounted Points and Mounted Wheels — Radiac Internal Grinding Wheels — Radiac Abrasive Cut-Off Machines and Discs.

For Fast Stock Removal, Long Life, Cool Cutting—

RADIAC*

A. P. DE SANNO & SON, INC., 462 Wheatland Street, Phoenixville, Pa., Since 1893

NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • LOS ANGELES

*T.M. Reg. U.S. Pat. Off. Copyright, 1944, A. P. de Sanno & Son, Inc.

Cutting oil *News* letter

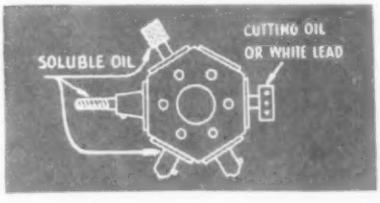
Practical suggestions from the field on how cutting oils and coolants are being used by midwest machine operators to lick tough wartime jobs.

MARCH, 1944

Machining time cut in half. An Indianapolis plant had trouble machining a rack without tearing or scratching the metal. This stainless steel rack had 65 teeth, .040 inch deep, of 64 pitch and ¼ inch face. Good results with ordinary oils were obtained only when the machine worked at slowest feed. Better results were obtained when carbon tetrachloride was added, but it made the operators sick. Stanicut 309 BCS was tried. Reports show it gave excellent results at faster speeds, cut the machining time in half, and had no ill effects on operators.

Three tips on better tapping. A big automotive plant in Michigan reports that Stanicut 155 CS was the complete answer to three tapping problems: 1. In a nut tapper Stanicut cleared up trouble in getting proper finish on Nickel-Molybdenum steel, giving better threads, lower oil consumption, and 80% longer tap life; 2. On thread rollers, using the same steel, Stanicut improved cooling, considerably extended die life; 3. On a tapper, Stanicut helped produce a perfect thread and made tools last longer, eliminating thread tearing and short die life in tapping a 2¾ inch packing nut (same steel).

One oil all around on turret lathe. Carboloy tools on a turret lathe required a soluble oil, but a threading



operation on the same lathe required a cutting oil to give reasonable die life. This meant swabbing the die with cutting oil, which then had to be cleaned from the bomb part being machined. At another plant, in machining steel bolts on a turret lathe, it was necessary to use white lead on the threading operation to get smooth threads, although soluble oil was needed for the other operations. Both plants switched to Stanicool H.D. Soluble Oil for both machining and threading at the suggestion of a Standard Oil Engineer. In both cases, threads improved and tool life was lengthened without sacrificing the cooling quality needed on the other operations.

Stanicool H.D.—a heavy duty, emulsifiable oil—will do many of the in-between jobs on which a cutting oil won't give adequate cooling, and a conventional soluble oil won't give the required finish or tool life.

No mixing . . . no mixup. A Michigan plant turning small rifle parts found that Stanicut 137 BCS gave much longer tool life than the base oil—paraffin oil mix formerly used. The use of Stanicut automatically eliminated a mixing operation and the chance of a mistake in mixing; and the use of one product simplified the jobs of ordering, stocking, and issuing.

When you bump up against special cutting oil problems

If you are running into trouble in handling war work, and find it tough to get the necessary accuracy, finish, and tool life on converted machines . . . or if you have other perplexing machining jobs that a more efficient application of cutting oils may help answer . . . call in a Standard Cutting Oil Specialist. Phone or write Standard Oil Company (Indiana) office, or 910 S. Michigan Ave., Chicago 5, Ill., for the Engineer nearest you. In Nebraska, contact any Standard Oil Company of Nebraska office.

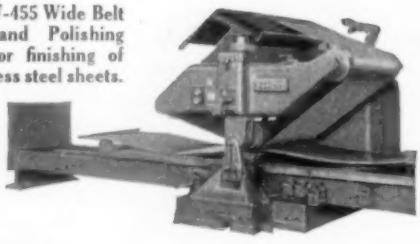
Oil is Ammunition . . . Use it Wisely

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATI

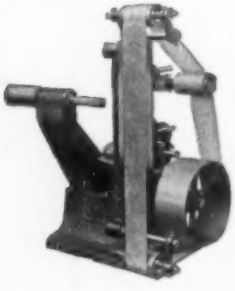
MATTISON
ABRASIVE BELT GRINDING AND POLISHING MACHINES

Mattison W-455 Wide Belt Grinding and Polishing Machine for finishing of wide stainless steel sheets.

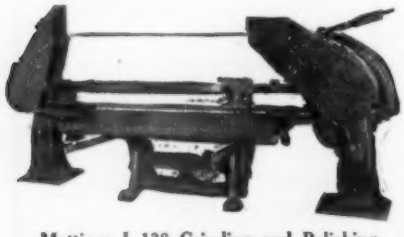


Mattison S-441 Grinding and Polishing Machine for flat and curved work. Can be furnished with or without special fixtures, depending on work ground ➡

Mattison J-135 Backstand Idler adapts regular polishing Jack to the use of factory-coated abrasive belts.



Mattison J-115 Variety Belt Grinding and Polishing Machine for flat and curved surfaces. ⬅



Mattison L-138 Grinding and Polishing Machine arranged for wet grinding.

★ Results obtained in a number of plants definitely establish the use of factory coated abrasive belts as a most efficient practice. Besides reducing the number of rejections and improving the finish, they have cut the polishing cost per piece through increased production.

However, to secure full benefit from factory-coated abrasive belts, the right type of mechanical unit is necessary. The machine is all important for properly applying the abrasive to the particular job to be done.

Mattison Abrasive Belt Grinding and Polishing Machines are engineered with a knowledge of the factors involved to give the best application of belts. From the time factory-coated abrasive belts were introduced for metal grinding and polishing, Mattison's have developed and built machines to provide best results.

Mattison Abrasive Belt Grinding and Polishing Machines are used for smoothing up welding marks, polishing solid parts—such as handwheels, levers, handles, steel sheets including stainless steel—and the inside of tubes. They are built for both the wet and dry grinding method. In addition to the finishing of metal parts, they are used for plastics, hardened rubber, fibre, glass, etc. In fact, the applications are so numerous, only a few can be mentioned and shown on this page.

MATTISON GRINDING MACHINERY

Whatever your problems may be, it is well worth while to make an investigation as to the machine available for handling it.

SEND FOR *FREE* BOOKLET

Illustrates various applications of Mattison Grinding and Polishing Machines, built to secure best results from factory-coated abrasive belts. Also gives helpful data on grinding and polishing metals, plastics and other materials with abrasive belts. Write today for your copy.

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

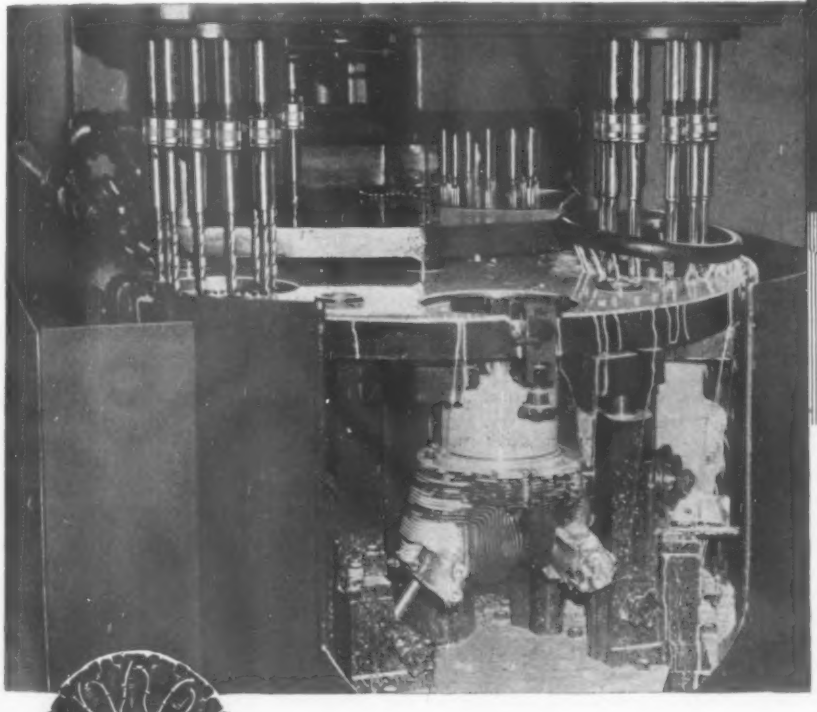
40 FLOATING HOLDERS and what they do*

What Gairing Floating Holders do for Wright is indicated below . . . what they *always* do when given an opportunity is a story that every machine tool production man and every operator should know and *understand.*

And that's easy, for if you understand the action of a universal joint, you will understand the action of a Gairing Full Floating Holder.

All of which means that when a self-contained fixture holding the work is set, the cutting tool held by a Gairing Full Floating Holder can't go wrong *regardless of any misalignment with the machine spindle.* It can't go wrong because the universal joint action eliminates side strain or any urge to one side of the bushing. The net result is that accuracy is maintained.

Gairing Floating Holders are quickly applied to any spindle, take cutting tools just as quickly. To ignore their value is a net loss.

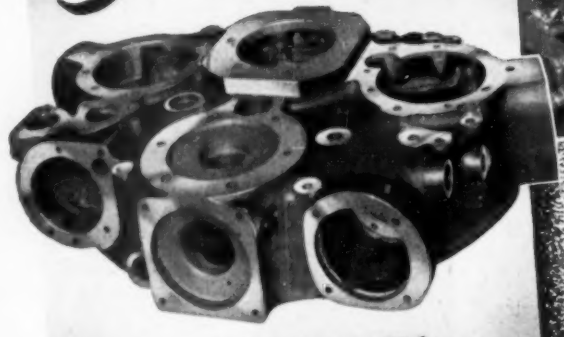


*Forty Gairing Full Floating Holders, equipped with the necessary cutting tools, drill and ream twenty holes in the cylinder barrel flanges of Wright Aircraft Engines. The machine is equipped with an automatic five position index.

GAIRING

The Gairing Tool Company, Detroit 32, Mich.
Manufacturers of Standard, Special and
Gair-Lock Inserted Blade Cutting Tools

5 MINUTES AND 48 SECONDS SAVED

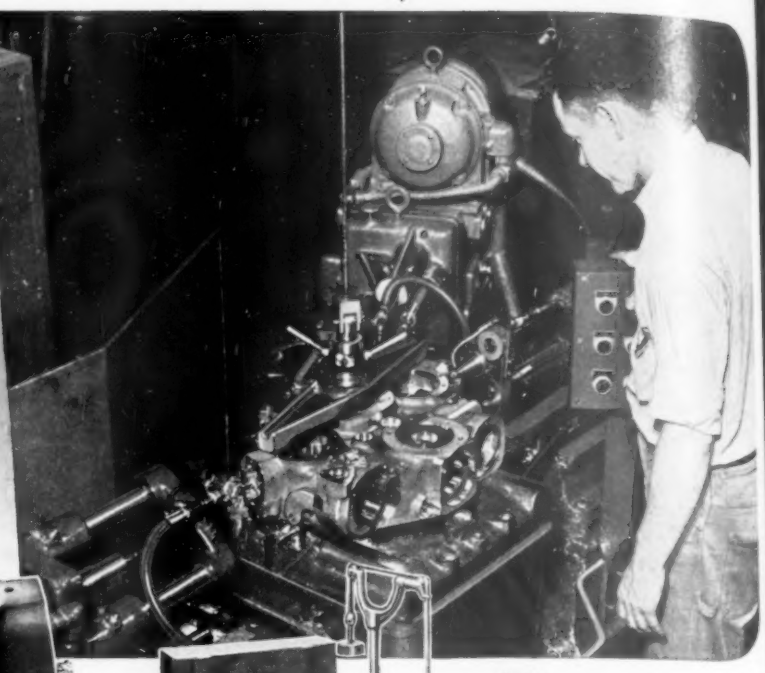


. . . In Drilling This Airplane Engine Crankcase

Here is another example of how Barnes unit-type drilling machines save time for this airplane engine manufacturer. The crankcase part was formerly machined in 7 minutes and 54 seconds on conventional drilling equipment with jigs. This 3-way, 3-spindle, unit-type machine cut the machining time to 2 minutes and 6 seconds. Provision is made for either step drilling or gun drilling the holes. Additional savings were effected in handling time because 3 spindles drill simultaneously instead of one at a time.

These machines are built from *standard* hydraulic feed and drive units which can be mounted in any position and easily rearranged to accommodate reasonable changes in the design of the workpiece.

Consult Our Engineers for a complete analysis of your metal working production problems. Their experience in designing and building special machine tools for drilling, milling, boring, tapping and similar operations for high production, will mean increased savings in time and manpower for you. Call on them without obligation.



Why Unit-Type Machine Tools Produce

More at Less Cost

Entirely special high production machining is available from unit-type machine tools. However, instead of being designed and built completely special, they are built from standard units which are arranged in the proper combination to suit the work to be done—*and can be rearranged to accommodate moderate changes in part design.* In this way all the advantages of special high production machines are available from *semi-standard machines.*

FREE - *13 Helpful Bulletins*

These two sets of bulletins illustrate how others have used Barnes special machines in solving their metal working production problems. They also describe the proper method and procedure in obtaining special machine tools to suit a specific problem. Write for them today. Ask for Bulletins 344.

W. F. & JOHN BARNES

W. F. and JOHN BARNES

325 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

THE *Carbide* AGE . . .

GREATEST STEP IN THE EVOLUTION OF CUTTING TOOLS

Miracles in metal working have revolutionized production . . . miracles that would have been impossible before the perfection of carbide cutting tools! Steel alloys of extreme hardness (Brinell 405) are being machined today to "high polish" finishes with carbide tools, *at rates ten times faster than formerly possible.*

Cutting tools of "yesterday" are obsolete in competition with the speed-machining that is possible with modern **WESSON** Carbide Cutting Tools.

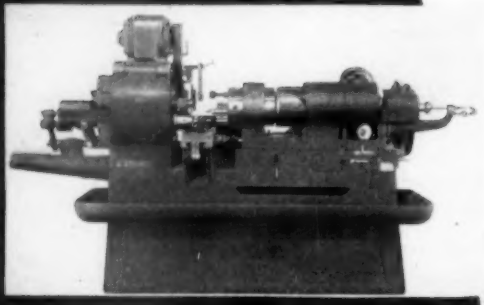
Industry is moving into "The Carbide Age" fast . . . **WESSON** pioneering, experience and leadership in design and production of carbide tools, are now aiding many manufacturers to plan complete *carbide* re-tooling based on greatly increased metalworking feeds and speeds . . . with **WESSON** Carbide Tools capable of production schedules that would have seemed fantastic three years ago.

Re-tooling programs planned now will set up priorities for your tool requirements later. Phone, wire or write

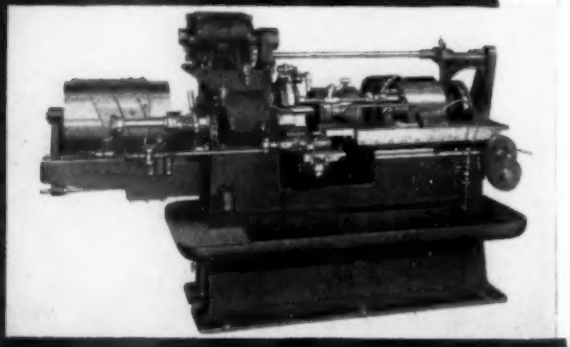
WESSON COMPANY, DETROIT 20, MICH.
(Ferndale Station)

Speeds and feeds that surpass those used in woodworking are now possible in metalworking . . . WESSON Carbide Tools are machining the new, tougher, harder metals faster . . . with finer finishes . . . to closer tolerances for higher precision . . . at less cost than ever before in history. With WESSON Carbide Cutting Tools, less frequent re-grinding is required . . . tool life is longer . . . production is stepped *up*, while costs are knocked *down*. Truly, this is "The Carbide Age" of progress in industry!

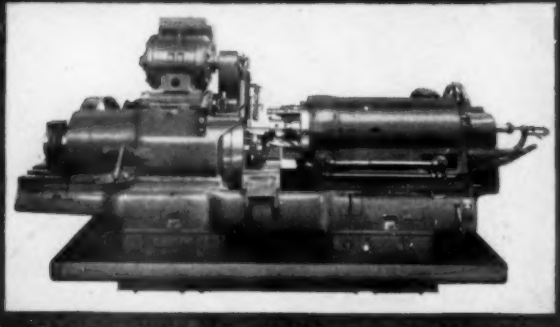
THERE'S A CLEVELAND



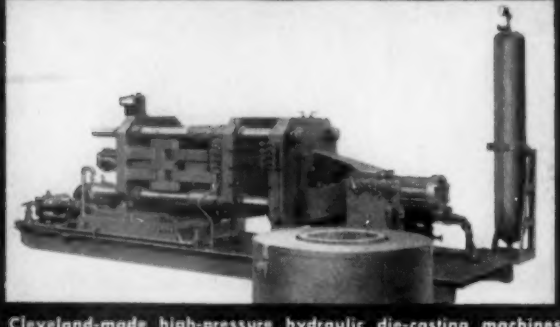
Nine variations of Model A Clevelands handle all metals, round, hex or square, in sizes from 9/16" to 2½" in overlapping capacities.



Four Model B Clevelands have work ranges from 9/16" to 2½" diameters and up to 18" lengths.



Four larger Model A Clevelands have overlapping capacities for 3¾" to 8" bar and 9½" and 10" tube stock.



Cleveland-made high-pressure hydraulic die-casting machines (for magnesium, aluminum, bronze, brass, lead, tin or zinc) still further increase the broad scope of production possible with Cleveland equipment.

To Cut YOUR Bar Machining Costs

THERE is a Cleveland for almost every type of turning and forming problem, from small automatic parts production through the full range of sizes to 8-inch bar or 10-inch tube work, including 18-inch shaft, or threading jobs up to 2½" diameter. On jobs as small as *fifty* pieces, or in thousands, *Clevelands can show economy.*

The most direct way to show YOU is to demonstrate this economy on YOUR job. That we can do if you will . . . (a) send us production blueprints of a job on which you would like to cut costs, or . . . (b) permit us to send a Cleveland engineer to your plant to work in collaboration with your production men on a survey of method. We'll describe this offer in greater detail if you wish.

Please write direct to the Cleveland Automatic Machine Company main office, 2269 Ashland Road, Cleveland 3, Ohio.

REMEMBER—CLEVELANDS CUT COSTS

THE CLEVELAND AUTOMATIC MACHINE CO.

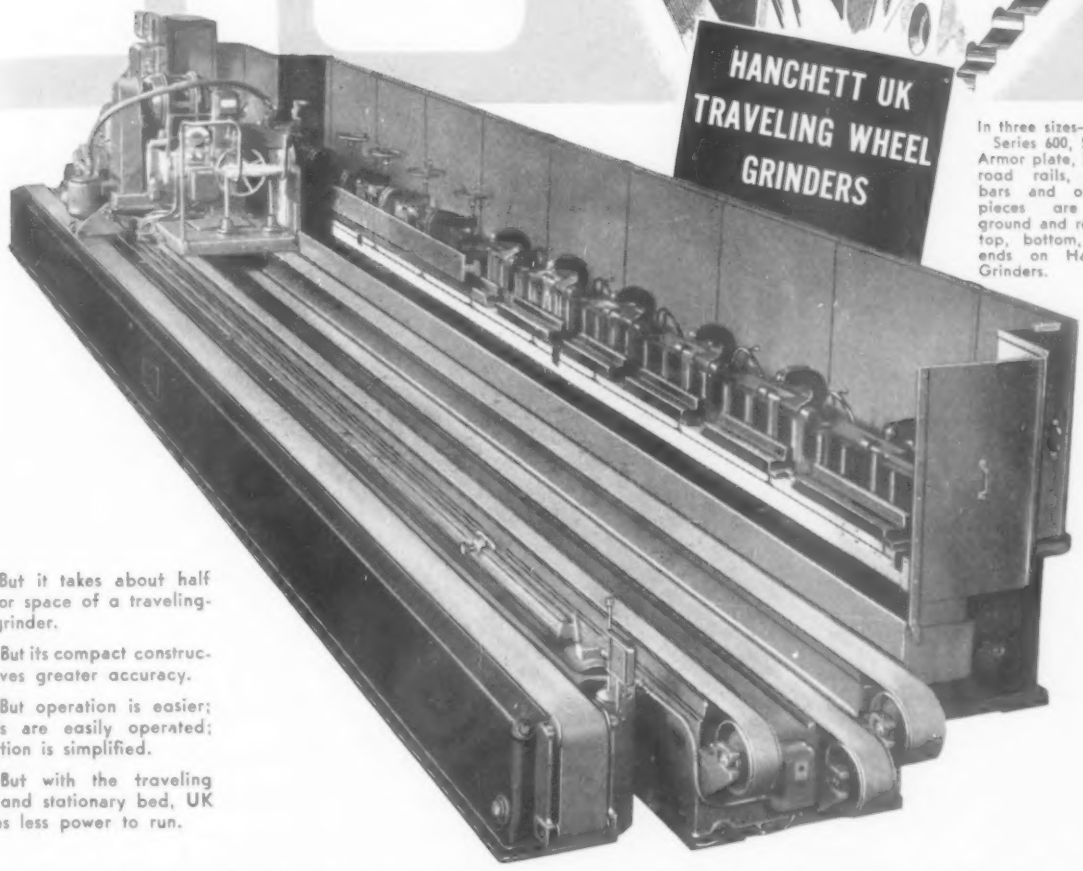
CLEVELAND 3, OHIO

CHICAGO.....1408 Civic Opera Building
DETROIT.....540 New Center Building
NEWARK..902 American Insurance Bldg.
CINCINNATI.....1315 American Building

FOR *Big* GRINDING JOBS

HANCHETT UK TRAVELING WHEEL GRINDERS

In three sizes—Series 500, Series 600, Series 700. Armor plate, 32-foot railroad rails, locomotive bars and other heavy pieces are precision ground and refinished on top, bottom, sides and ends on Hanchett UK Grinders.



BIG—But it takes about half the floor space of a traveling-table grinder.

BIG—But its compact construction gives greater accuracy.

BIG—But operation is easier; controls are easily operated; lubrication is simplified.

BIG—But with the traveling wheel and stationary bed, UK requires less power to run.

Production engineers will appreciate the accurate finish of work from UK grinders, their operating ease, their enduring dependability. Plant designers and operators like the great saving in floor space and easy "set-ups" for grinding jobs. UK's are adaptable to an almost unlimited variety of work. Continuous production is possible, for while one job is being ground the next job can be set up on the unused portion of the bed. Work is under close and constant observation of the operator, who rides the grinding wheel carriage with all controls at his fingertips. Series 600 and Series 700 machines, equipped with grinding wheel heads which tilt to 30°, grind accurate bevels and precise angles. Auto feed-in and wet grinding system are standard on all UK's.

Call upon Hanchett's experienced engineers to help you with your grinding problems. There is no obligation.

Get full details in Bulletin 170 T-5.

HANCHETT GRINDERS — BIG RAPIDS MICHIGAN

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.

Webber MICRO ACCURATE Gager

The mark of

PERFECTION *in* GAGE BLOCKS

● Among thousands of users of gage blocks—*all over the world*—the Webber trade mark is recognized as the mark of perfection.

By perfection we mean gage blocks that are dependably accurate, long-wearing and backed by prompt, capable, willing service.

Webber gage blocks are the product of the largest exclusive producer of gage blocks. Long years of experience and extensive resources of the Webber organization assure constant product improvement.

Look for the Webber "mark of perfection" when you buy gage blocks—you can depend on it.

Webber Gage Blocks are furnished in "A" accuracy sets to .000004 of an inch—in "B" accuracy sets to .000008 of an inch.

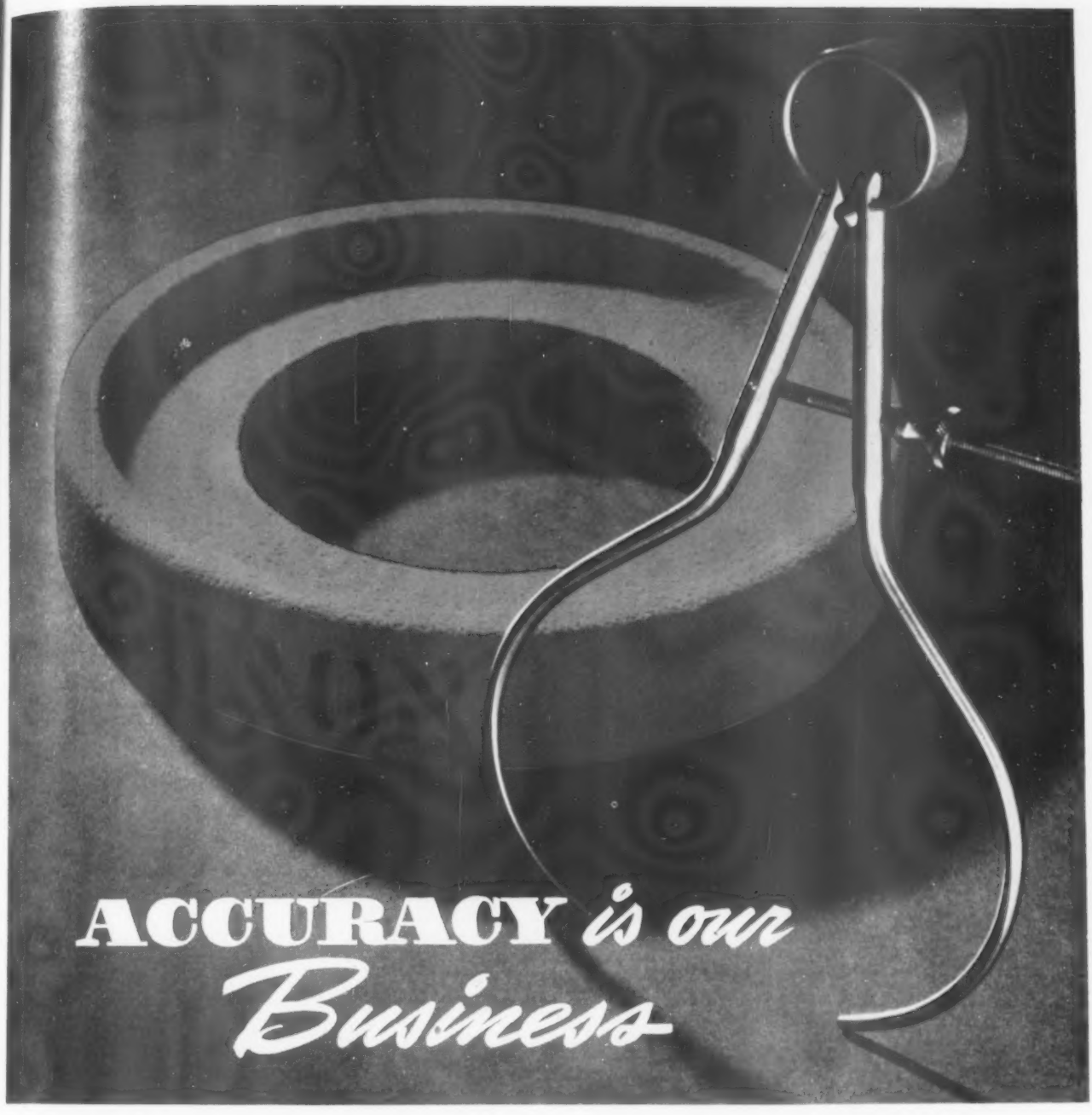
Prompt delivery on the following sets—

Set No. 84A—$350.00
Set No. 84B—$235.00
Set No. 43A—$185.00
Set No. 43B—$150.00
Set No. 38A (Thin Blocks) $195.00
Set No. 38B (Thin Blocks) $155.00
Set No. 14A (Angle Blocks) $450.00

Webber's service includes complete facilities for inspecting—reconditioning and replacing worn or damaged blocks at a moderate cost.

Webber GAGE COMPANY

12908 TRISKETT RD., CLEVELAND 11, OHIO



Meeting the stern demands of America's War Industries, NUBON grinding wheels have earned unqualified endorsement for Accuracy and Uniformity.

Uniformity is achieved by our exclusive *Controlled Trial Plan* of engineering which puts the precision and speed of our production facilities at your instant command. NUBON grinding wheels are custom made to solve your problem. Thereafter, precision production control, from ingredients to finished product, assures accurate uniformity.

Production time is slashed by our special bonding process. Speedy ten-day delivery guaranteed — even faster service in an emergency. Send for your copy of our catalog, today.

New wheels for new jobs in a hurry. Our speedy service means that our customers can cut down grinding wheel inventories, and alter grinding jobs without losing one second of efficiency.

UNIVERSAL WHEEL & ABRASIVE CORP.

2626 WEST VAN BUREN STREET, CHICAGO 12, ILLINOIS

NUBON 24 HOUR PROCESS GRINDING WHEELS AND STONES

POSTWAR PRODUCTION WILL NECESSITATE

AUTOMATIC LOADING OF MANY PARTS

● **The illustrations on this page show one type of Automatic Loader developed by Seneca Falls' engineers for handling valve guides of varying length and diameter. It is installed on a Lo-swing IMP Automatic Lathe, having a built-in Quick Change-Over Mechanism which provides a simple means of changing carriage stroke for different length guides.**

The operator merely starts the machine and keeps the loading chute filled. One operator can attend a battery of such lathes.

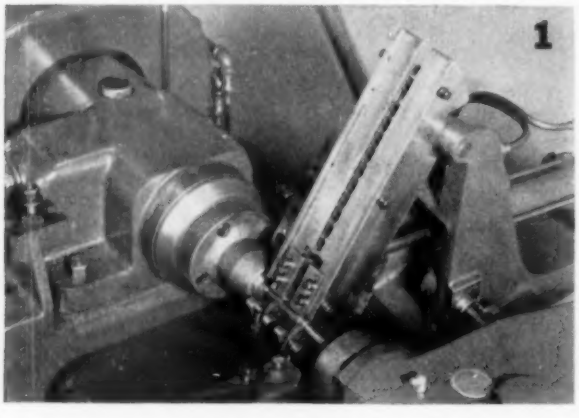
Seneca Falls' engineers have amassed a wealth of experience, not only in automatic turning; but in the synchronization of automatic work handling devices to highly productive Lo-swing Lathes. Perhaps this experience can be applied to *your* present or postwar problems.

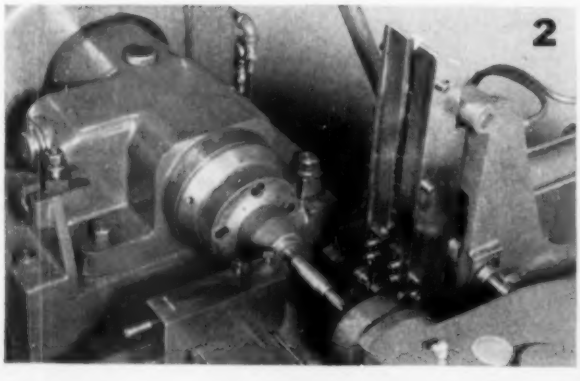
SENECA FALLS MACHINE CO.
Seneca Falls, New York

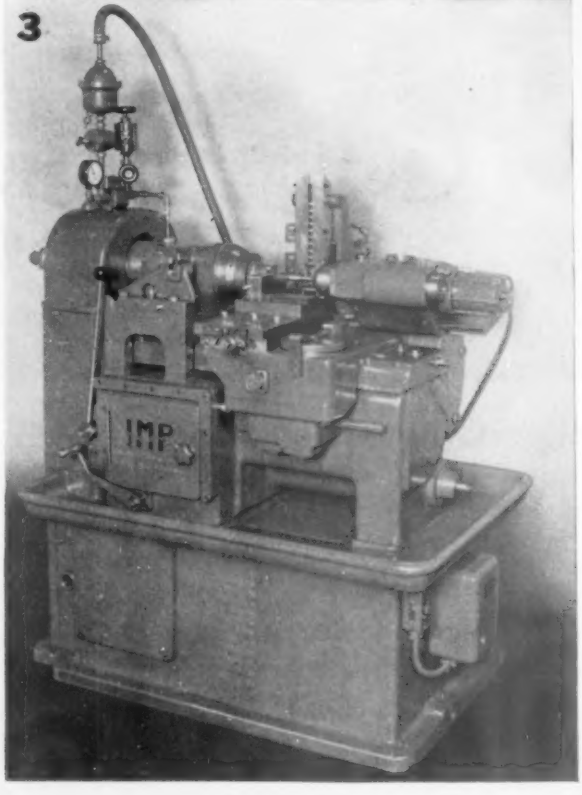
1. *Loading chute in forward position placing rough work between centers. Chute then withdraws to clear tools.*

2. *Tool has completed cut, centers are about to withdraw allowing finished piece to drop into unloading chute.*

3. *View of complete machine.*



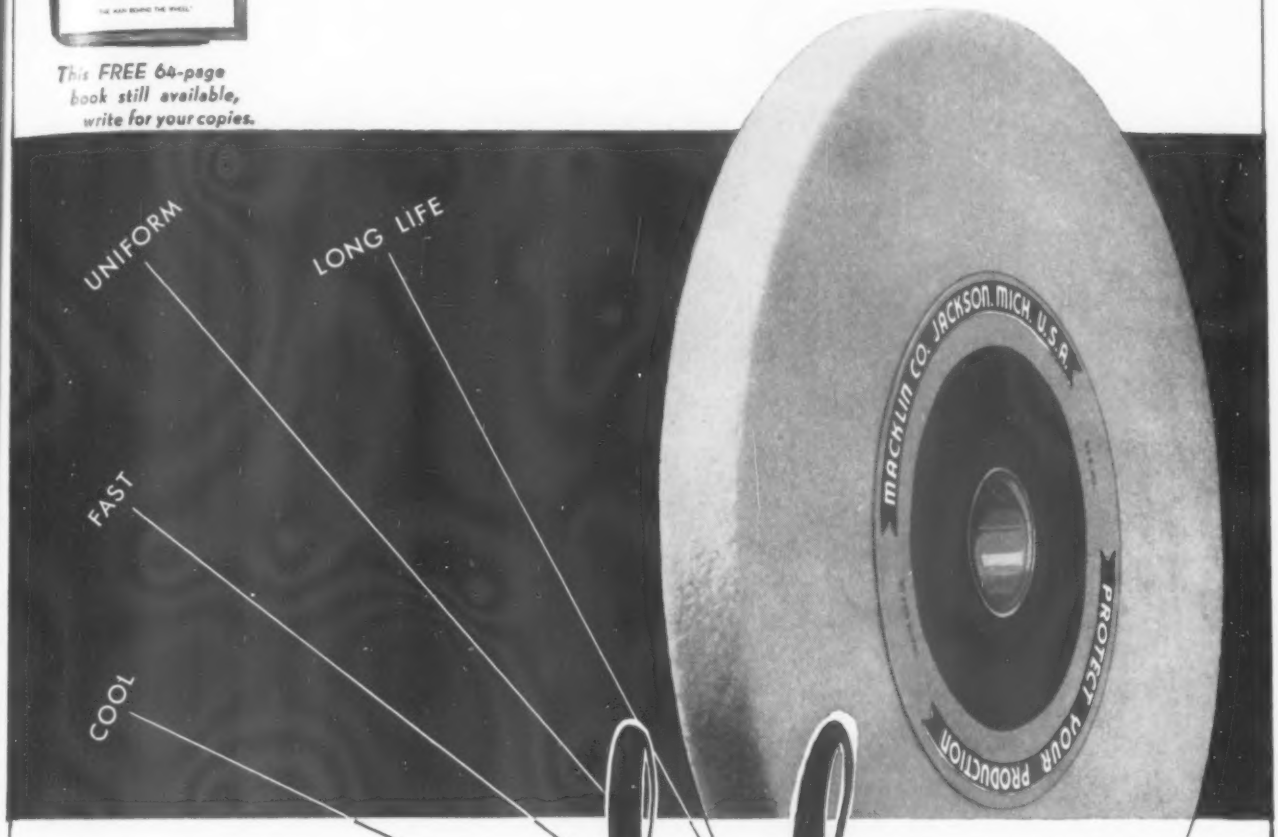




LATHE NEWS *from* SENECA FALLS

This FREE 64-page book still available, write for your copies.

"Protect your Production"



Macklin

MACKLIN HIGH QUALITY WHEELS FOR EVERY GRINDING PURPOSE WILL

"PROTECT YOUR PRODUCTION"

Ask for the services of a Macklin Field Engineer

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

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A Good Head on its Shoulders

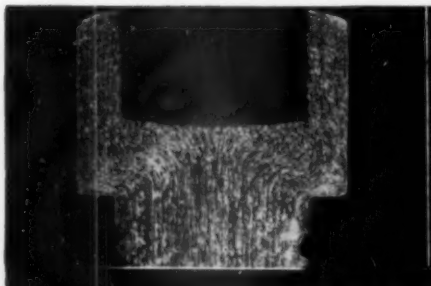
PARKER-KALON SOCKET SCREWS

THERE'S a good reason for the *good head* on Parker-Kalon Socket Screws. Accuracy, strength and neatness are predetermined by Parker-Kalon's unequalled Quality-Control routine.

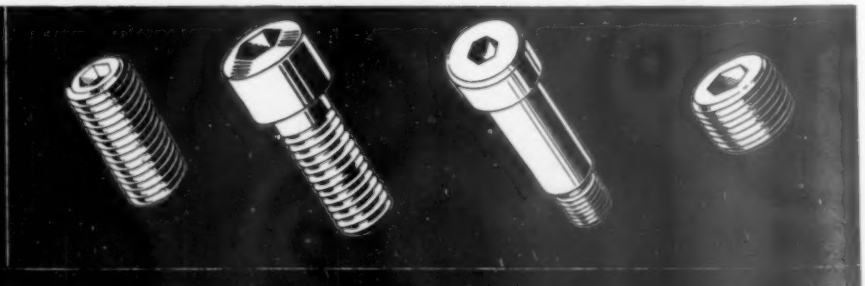
Starting when the wire stock enters the P-K plant, and ending only when the finished screws are packed, the P-K Quality-Control Laboratory checks every mechanical and physical characteristic of P-K Cold-forged Socket Screws. Tests and inspections cover Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Thread Fit.

When you specify *Parker-Kalon* Socket Screws you get unusual protection against "doubtful" screws – screws that *look* all right, but some of which fail to *work* right. Parker-Kalon Corp., 190-198 Varick Street, New York 14, N. Y.

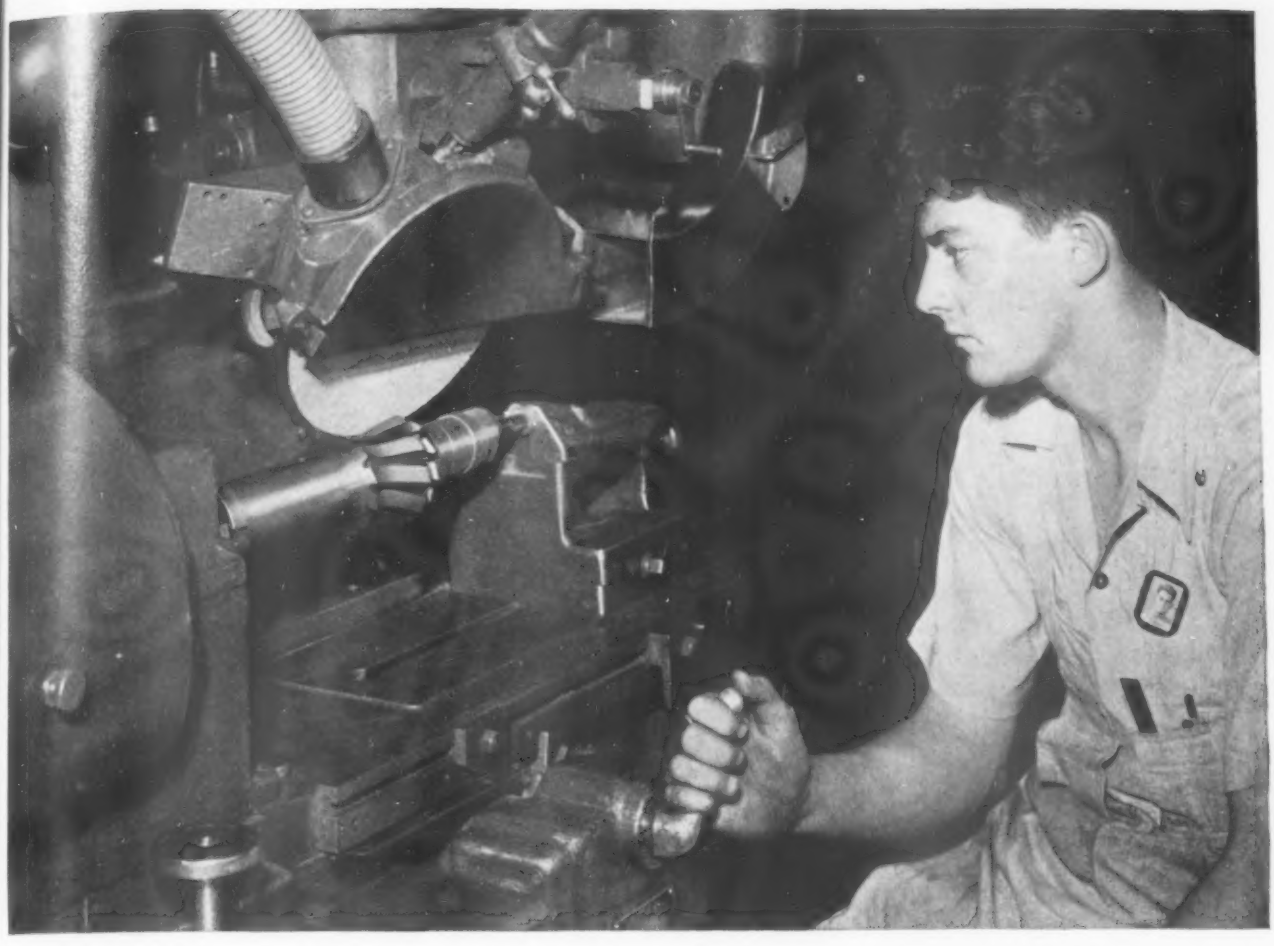
COLD-FORGED FOR STRENGTH



SET SCREWS CAP SCREWS STRIPPER BOLTS PIPE PLUGS

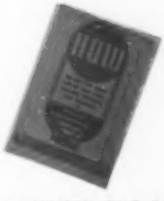


A Product of **PARKER-KALON**--*Specialists in Fastening Devices*



PROPER SHARPENING WILL HELP TO GIVE LONGER LIFE TO YOUR MILLING CUTTERS

WITH a widely-recognized urgency for conservation of cutting power, more and more users of milling cutters are making strong efforts to see that wasteful mistreatment of small tools is eliminated. Many of them have studied this problem as it applies in their own plants and have set up standards of procedure which have resulted in substantial economies. It is often found that much of a cutter's original accuracy and cutting power is sacrificed through improper sharpening. "Proper sharpening" means keen cutting edge, absence of both diameter and face run-out, and correct cutting clearances for the job. On form-relieved cutters, special attention must be given to radial tooth faces, uniform index, and accurate gash angle. Principles of proper cutter sharpening are set forth in our booklet "How To Get the Most Out of Your Milling Cutters". Copies are available for members of your organization who need this type of information, simply by making a request on company letterhead. *Get the most out of your cutters* by proper sharpening.



SEE PAGES 283-291

Buy War Bonds

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 105 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

DRIVES RIVNUTS 6 TO 8 TIMES FASTER!

NEW Thor Auto RIV-Driver

SPECIFICATIONS

SIZE No. . . . . RN

CAPACITY

Std.—Rivnuts with #6x32 internal screw thread.

Optional—#8x32 Rivnuts or #10x32 Rivnuts.

Weight. . . . . 4¼ lbs.

Length overall . 9½ inches

Speed,

1000 R.P.M. Forward

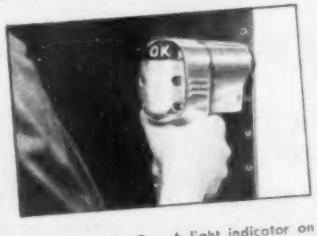
2000 R.P.M. Reverse

Spindle Offset. . . . . 7/8"

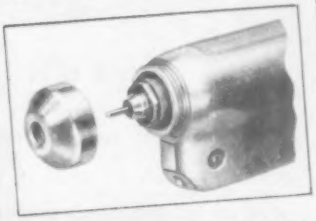
THE ONLY RIVNUT INSTALLATION TOOL THAT IS COMPLETELY AUTOMATIC, POSITIVE . . . FOOLPROOF

Here, at last, is the precision power tool that opens the way to new production records on assembly operations where the advantages of B. F. Goodrich RIVNUTS are utilized. With the Thor Auto RIV-Driver, the installation of Rivnuts is simple, fast and completely automatic. The tool does the entire job of running a threaded mandrel into the Rivnut, upsetting it, backing the mandrel out and stopping all action. The operator does nothing but press the throttle lever . . . makes no manual adjustments for any of the operations. Operating on a principle entirely new to portable power tools, the Thor Auto RIV-Driver makes Rivnut installation 6 to 8 times faster . . . and makes practical their use on scores of new applications.

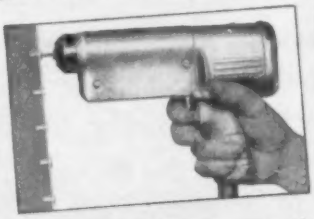
LOOK AT THESE EXCLUSIVE FEATURES



VISUAL INDICATOR—A light indicator on the handle of the Auto RIV-Driver lights up when the Rivnut is properly upset; does not light if Rivnut is incorrectly headed.



DEPTH CONTROL—The Auto RIV-Driver can be adjusted to upset Rivnuts at any depth required by the thickness of the metal. This precise depth of upset is maintained for every Rivnut.



OPERATING CYCLE—The sequence of operations in applying Rivnuts—running in, upsetting, backing out and stopping—is completely automatic with the Auto RIV-Driver. The order of the 4-cycle action, controlled by one throttle, cannot be affected by the operator.

UNIFORM RESULTS—The automatic action, positive depth control and visual indication of correct operation on the Auto RIV-Driver gives assurance that every Rivnut is driven properly and uniformly.

FOR FULL INFORMATION

Thor Bulletin No. 247 will give you detailed information on the new Auto RIV-Driver, including specifications, performance data, and construction features. Send for it today!

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

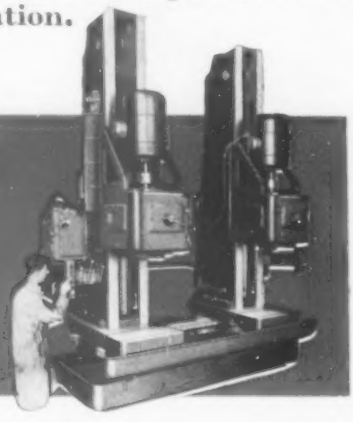
HOW and WHY

These Manufacturers Use Barnes Unit-Type Hydraulic Circuits

...when designing new equipment

Here are but three of the many ways in which progressive manufacturers are using Barnes Unit-Type Hydraulic Circuits. Perhaps an analysis of your present designs will also reveal a better way to do it hydraulically. Our engineers will be glad to work with you on new designs or changeovers. There is no obligation.

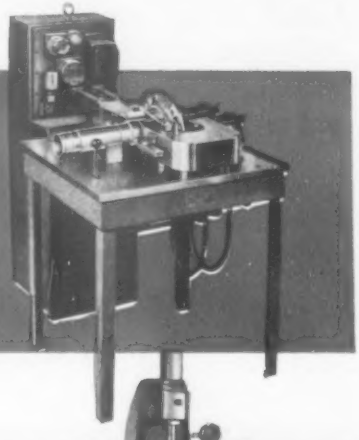
FOR SPECIAL PRODUCTION MACHINE TOOLS



HOW: This manufacturer uses Barnes Hydraulic Units for actuating the vertical heads of this connecting rod boring machine.

WHY: The complete designing and manufacturing of the machine was being done while we designed the hydraulic structure. Both design and assembly time were cut to a minimum.

FOR COMPACT RIVETING MACHINES



HOW: This manufacturer incorporated the hydraulic unit as an integral part of the design of this 15 ton capacity riveter. Presenting his problem to Barnes in its early stages made this possible.

WHY: To get a riveter with a rapid and smooth stroke in the shortest possible time and with a minimum of equipment.

FOR HYDRAULIC PRESSES

HOW: This manufacturer designed this press to supplement his line of smaller hand presses. The press capacity is 10 tons and so sensitive it can be used to bend a shaft as little as .001".

WHY: To obtain ease of operation; flexible, sensitive control; high production possibilities; and safety of operation.

HERE'S HOW YOU CAN BENEFIT WITH BARNES HYDRAULIC UNITS

When designing or redesigning your machines you can save design and assembly time, improve machine performance and speed delivery by using the Barnes Unit-Type method of securing hydraulics. You merely establish the functions to be done hydraulically—our engineers will design the proper circuit and unit while you design the machine itself. All hydraulic elements come from one source—eliminating divided responsibility for the hydraulic performance of your machine.

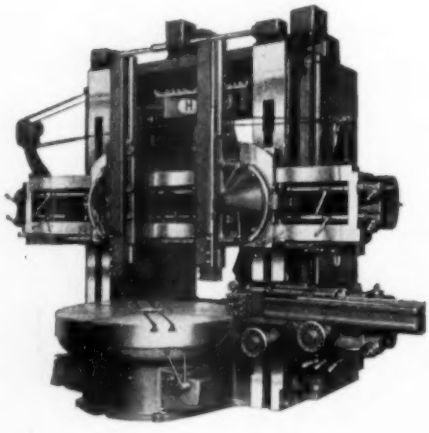
BARNES *hydraulics*

FREE DATA *Get additional facts from this booklet containing detailed descriptions of Barnes Hydraulic Elements and typical installation circuits. Send today for your free copy of Booklet T. E. 344.*

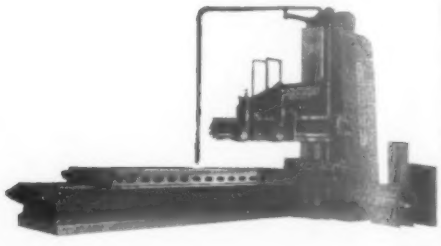
John S. Barnes Corporation ROCKFORD, ILLINOIS

Cincinnati Hypro Machine Tools Modernize Aircraft Tool Rooms

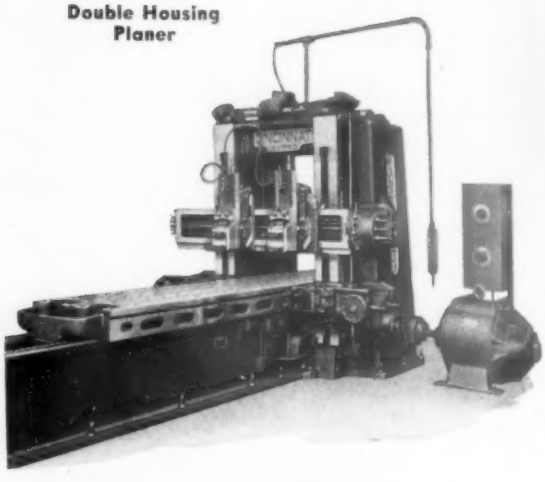
Vertical Boring Mill



Open Side Planer



Double Housing Planer



Leading aircraft manufacturers have found that installation of improved Cincinnati Hypro Machine Tools in their tool room assures accuracy and faster production.

Now is the Time to Replace that Old, Worn Out, Antiquated Machine with a New Hypro.

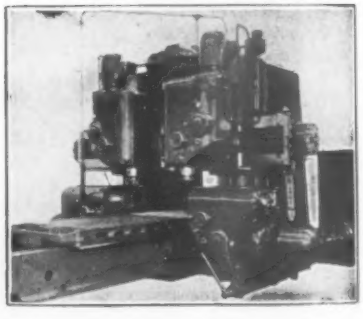
Take out 2 or 3 old machines and put in one modern tool. This will permit more floor space for other modern tools and increase production. The most important thing is to win this war and win it fast.

Cincinnati Hypro Planers are of Double Housing and Openside Types ranging in size from 24".

Cincinnati Hypro Vertical Boring and Turning Mills range from 54".

Cincinnati Hypro Planer Type Milling Machines are built in sizes from 30" and are provided with 7½" or 9½" Quill Milling Heads.

Planer Type Miller



Write for Bulletin 153-TE illustrating the Hypro Line or tell us your specific needs.

THE CINCINNATI PLANER COMPANY

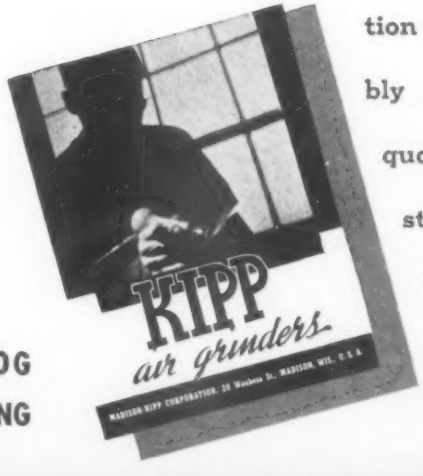
Planers...Vertical Boring Mills...Planer Type Millers

CINCINNATI . OHIO . U.S.A.

Madison KIPP air GRINDERS

Developed by Practical Toolmakers for Thousands of New Uses —

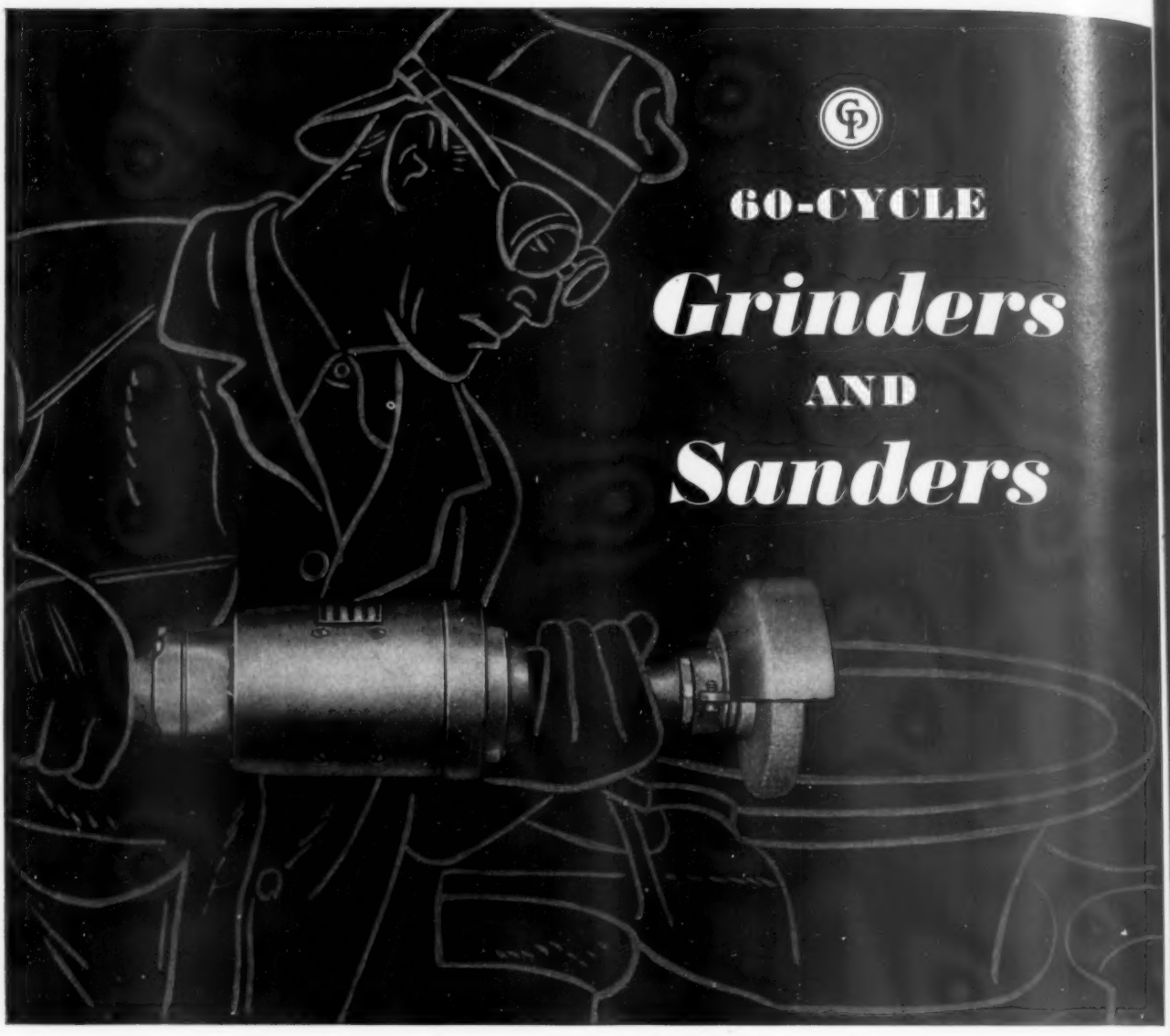
Every toolmaker, every tool crib, every machine shop and thousands of production jobs need a Model H, K or VT Kipp Air Grinder or all three of them. Because of expanded facilities the delivery position on high ratings has been measurably improved. Accessories in reasonable quantities can usually be shipped out of stock. Madison-Kipp Air Grinders were developed by practicing tool makers so they are practical. They usually pay for themselves on a single job.



KIPP *air* TOOL CATALOG IS *Yours* FOR THE ASKING

MADISON-KIPP CORPORATION, 209 Waubesa St., Madison 4, Wis., U. S. A.

Sole Agent in England: Wm. Coulthard & Co., Ltd., Carlisle



. . . maintain speed under load

IDEAL for plants whose operations do not warrant the installation of high frequency tools — or plants that have such tools but lack high frequency power lines at points where additional tools could be advantageously used, CP-460 Grinders and Sanders afford fast, uniform grinding and sanding. They have a powerful, efficient, lightweight induction motor of the same type as the well-known CP Hicycle Grinder but operate on 60-cycle, 3-phase, 220-volt A.C. This motor insures high sustained speed under load. Absence of commutators, brushes, brush holders, armatures, etc., assure lower maintenance costs. Write for complete details on CP-460 Grinders, Sanders.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY
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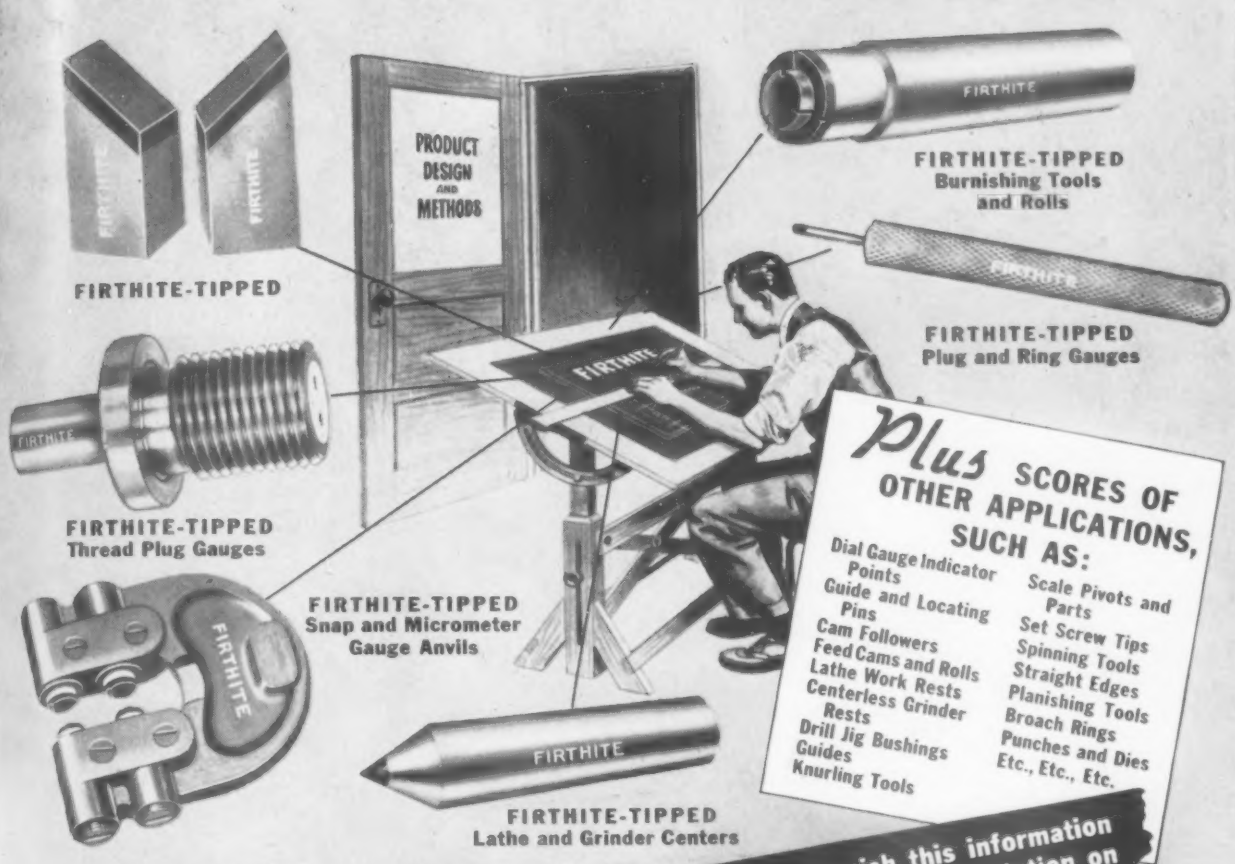
"WEARPROOF" with Firthite...
if your work, machines, or equipment involves ABRASION



FIRTHITE-TIPPED

FIRTHITE-TIPPED
Burnishing Tools and Rolls

FIRTHITE-TIPPED
Plug and Ring Gauges

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Thread Plug Gauges

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Snap and Micrometer Gauge Anvils

FIRTHITE-TIPPED
Lathe and Grinder Centers

Plus SCORES OF OTHER APPLICATIONS, SUCH AS:

- Dial Gauge Indicator Points
- Guide and Locating Pins
- Cam Followers
- Feed Cams and Rolls
- Lathe Work Rests
- Centerless Grinder Rests
- Drill Jig Bushings
- Guides
- Knurling Tools
- Scale Pivots and Parts
- Set Screw Tips
- Spinning Tools
- Straight Edges
- Planishing Tools
- Broach Rings
- Punches and Dies
- Etc., Etc., Etc.

Extraordinary resistance to "wear and tear" (whether from abrasion, corrosion, or heat) is the outstanding quality of FIRTHITE Sintered Carbide. Its intense hardness, rigidity, and stability make it the BEST material for long life under extremely severe service conditions. A FIRTHITE insert will outlast hardened steel, chrome plating, nitriding, or hard facing—many times over. Insert FIRTHITE at the point of greatest wear!

Please furnish this information when you request quotation on FIRTHITE wear-resistant parts:

IF YOU WANT to eliminate product rejections by maintaining accuracy . . . reduce maintenance of machines and equipment and thereby cut costs . . . minimize replacement of parts and thus save time and materials—**THEN SEND US** full particulars of your present equipment and process, including working drawings and samples of blank and part to be produced.

Firth-Sterling
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Makers of High-Speed Steels, Tool and Die Steels, and Sintered Carbides

Hannifin 75-ton hydraulic press at work straightening transmission gear shafts at a plant of Mack Manufacturing Corporation, builders of Mack trucks, buses, and fire apparatus.

Mack Trucks, built to the high standards of quality and long life that have put the phrase "Built like a Mack truck" into our everyday language, take advantage of every production facility to attain quality production rapidly and consistently.

For straightening operations, such as those here shown, Hannifin hydraulic presses provide fast action and consistently easy control for sustained precision work. The exclusive Hannifin sensitive pressure control gives the operator an infinitely variable ram pressure from a few pounds to full capacity at a finger tip touch. This control is so simple to handle, so natural, that operators can maintain high production rates and precision straightening with ease.

Hannifin hydraulic straightening presses are built in a full range of standard sizes from 6 tons to 150 tons capacity, with dimensions and details readily adapted to individual needs. Stroke, speeds, gap, reach, table and fixture design are readily modified to meet your straightening requirements. Other presses for forcing, press-assembly, etc., from 5 tons to 200 tons capacity. Write for press bulletins, or consult Hannifin engineers for specific recommendations.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue, Chicago 24, Illinois
Detroit Representative: R. A. Bean, Hayward Building, 4829 Woodward Avenue. Telephone Columbia 4949

HANNIFIN *hydraulic* PRESSES

PRODUCTION PERSPECTIVES

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

WAR PRODUCTION: 1944 outlook calls for cutbacks in many categories, more than balanced by gains in a half dozen others. Production may expand 17 per cent, with biggest gains in aircraft, landing craft, heavy auto units, airborne communications devices....Reconversion will be touch-and-go, WPB holding the lid on until the armed forces give the green light.

AIRCRAFT: January plane production dropped to 13 fewer units than in December - but, airframe weight jumped 5.4 per cent. Weight per plane now averages 10,000 pounds, compared with 8,630 pounds per plane last year. Therein hangs the story of America's growing aircraft production, an indication of production emphasis in coming months. More bombers will be turned out, fewer trainers and fighters will be built.

STREAMLINED PRODUCTION: Credit for continued increase in plane production must go to engineers who cut manhours on bombers from 200,000 for the first ship to 13,000 for the 2,000th unit. Manhours dropped 75 per cent each time output was doubled (see Streamlined Production, page 78).

MANPOWER: Last year's bugaboo is expected to give little trouble to production men during the next 3 months. The manpower outlook is encouraging. Earlier estimates of a rise of 900,000 in munition industry workers has been shelved. Employment is expected to hold at current level of 8,900,000.

CONJECTURE: Many believe that the expected loss of 800,000 workers to armed forces by mid-year will never be regained by industry. The only remaining labor pool consists of women - and 8 women leave the labor market for every 10 who enter it....Despite the fact that labor shortage areas now are increasing, the pinch is not expected to be really serious because expansion in 1944 war production will be centered in relatively few industries.

MACHINE TOOLS: Though output continues to decline, anticipated 1944 volume of $375,000,000 far exceeds any pre-war year....Russia is expected to provide 20 per cent of this year's market....CUTTING TOOLS: From a peak output of $41,454,000 last March, shipments have slipped to less than $29,000,000 monthly. Order backlogs have been reduced to less than 3 months shipments, may soon be down to a monthly consumption basis.

POST-WAR: Detroit automen, who smiled when they thought Kaiser would try to build cars on the west coast, gulped last month. The California miracle-worker incorporated the Michigan Kaiser Company in the motor capital, released just enough news to prove he is serious...it won't be long before west coast industry begins yellling. As emphasis in fighting swings to the Pacific, they visualize eastern industry reconverting, western industry deep in war work. Why, they will ask, should the east get such a break in the consumer market?

LAST-MINUTE NEWS REVIEW OF MASS MANUFACTURING

THE WOUNDED PLANE THAT *Flies* AGAIN

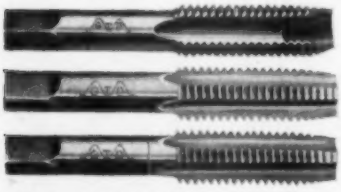
The Germans and the Japs do bring down some American planes — but they'd better be sure they fall in enemy territory. Otherwise, many of them have a way of coming up again, to do battle once more.

The damaged planes — called "hangar-queens" — are kept intact, till their undamaged parts are needed to repair another plane.

What makes possible this free interchange of parts is that miracle of modern manufacture which we're prone to take for granted — STANDARDIZATION.

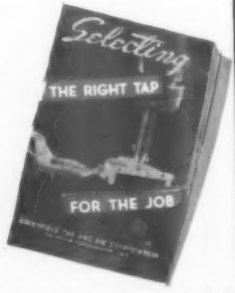
The striking story of the hangar-queen, made possible by standardization, only highlights its benefits to the world in *time of peace.* For not until the use of interchangeable parts made mass production possible did all the people begin to share the comforts formerly available only to the few. *And the end is not yet.*

Standard Threads - SAVE TIME - SAVE MONEY!



GUN TAP
•
CUT THREAD TAP
•
GROUND THREAD TAP

Here are 3 different types of Tap, all of the same size. One of these will best suit your requirements. You'll save money on your work if you first determine which of these types you should use, and thereafter specify this type for that job. This is "Standardization" in practice.



GREENFIELD TAP AND DIE CORPORATION

GREENFIELD
MASSACHUSETTS

TOOLING TO MACHINE HEAVY CASTINGS

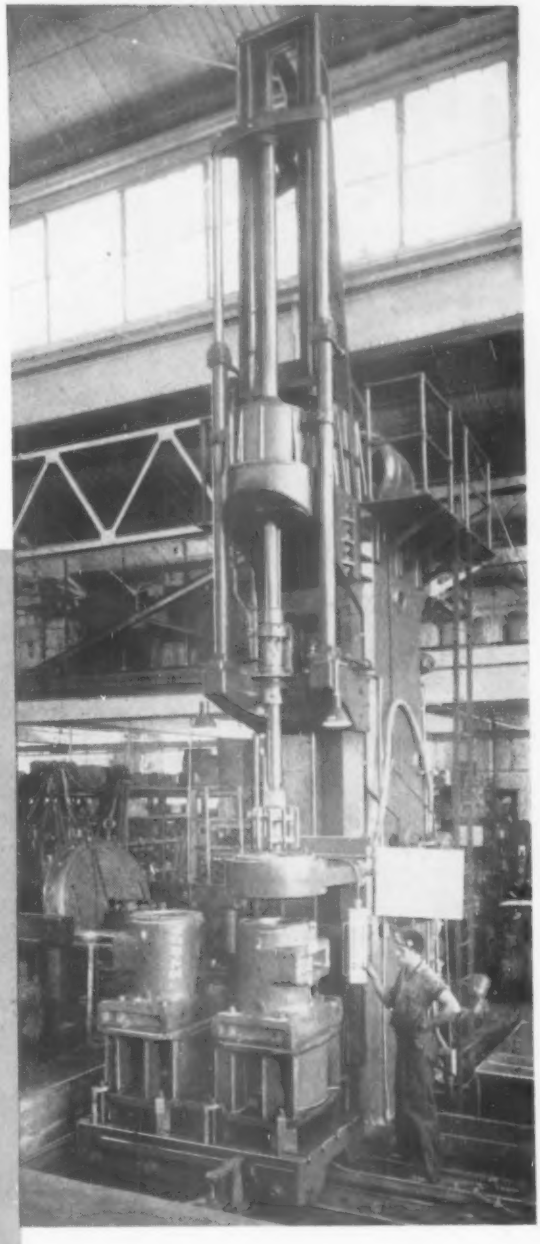
JEROME WILFORD
ASSOCIATE EDITOR

Design and construction of a 32-foot vertical honing machine and the use of cast boring bars, are typical Cooper-Bessemer tooling developments, applied to boost production efficiency

TURNING OUT Diesel engines, gas engines and compressors in unprecedented numbers, the production engineers of The Cooper-Bessemer Corporation have applied mass-manufacturing techniques to the problem of machining heavy castings. In the company's Mount Vernon, Ohio, plant, pre-loading of work, pre-set-ups of tools, and the development of a vertical honing machine, 32′ high, are typical of methods and equipment which have been introduced.

Details of machining progress, however, should be prefaced with a comparison of old and new methods of producing certain ready-to-machine parts, showing how a modern casting procedure has helped tremendously by eliminating much machining altogether.

This particular saving has been effected by substituting Meehanite castings for many parts which were previously steel forgings. Each part was of course subjected to careful stress analysis and redesign, when advantageous, and accompanied by the development of Meehanite castings of suitably high physical properties to make such substitutions practical. Tests conducted during the last nine years have proved that the cast parts met all physical requirements. How much may be saved is readily appreciated by considering the job of producing a crankshaft for



Right:

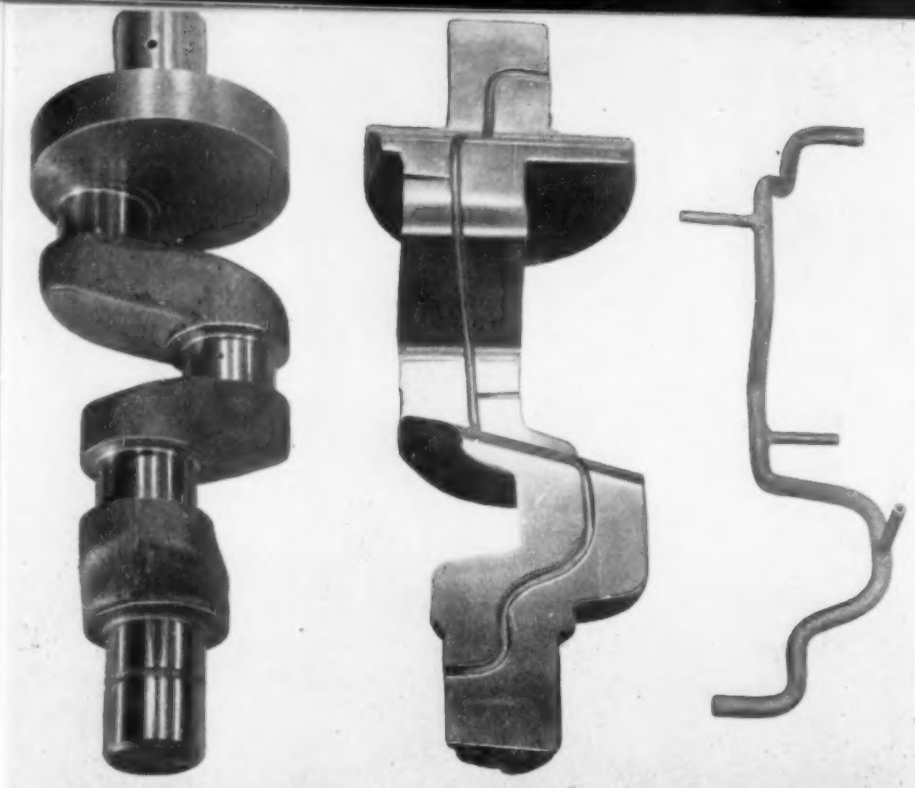
Perhaps the largest vertical honing machine in the country, this unit was designed and built by Cooper-Bessemer for producing finely finished surfaces on engine cylinder walls.

Machine stands 32' high, develops 90" stroke, and is push-button controlled.

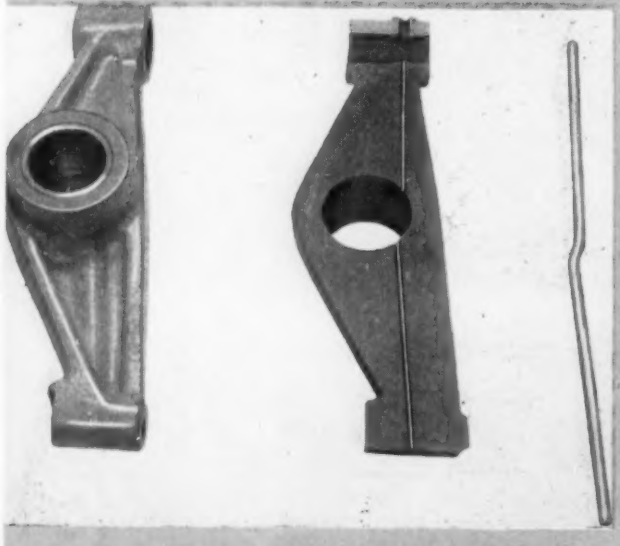
Cooper-Bessemer photos

Below:

Honing heads used on huge vertical honing machine range from 9½" to 26" in diameter.



This Diesel engine water pump crankshaft was formerly forged, requiring drilling of oil holes. It is now cast of Meehanite metal, with seamless steel tubing "cast in" for oil holes. Complete casting, cut-away section, and bench formed tube assembly are shown. Oil passages are now produced in one third of former time.



Diesel engine rocker-arm, cast of Meehanite, was formerly forged steel, requiring drilling of oil passages.

By casting in steel tubing, costly drilling operation is eliminated. Physical requirements are satisfied by casting.

an 8-cylinder marine Diesel engine.

The steel ingot for this engine's forged crankshaft weighs 36,000 pounds, but the completed shaft weighs only 12,000 pounds. Two-thirds of the original weight of metal, or 24,000 pounds of critical steel, must be removed by various machining operations. By casting this part, many man-hours devoted to sawing, chipping, drilling, turning, and boring are eliminated.

Not as spectacular, but perhaps more broadly applicable, the improvements in machining methods are well worth noting because they emphasize the type of progress being made by production engineers whose work lies on the borderline between jobbing and mass-producing.

VERTICAL HONING MACHINE

PERHAPS the largest vertical honing machine in the country is that which Cooper-Bessemer designed and built in 1942, for developing finely finished surfaces on cylinder walls. Including a platform above the column, the machine is 32′ high. The main column stands 18′ above the floor, and is sunk 2′ beneath floor level to provide crane clearance.

Developing a 90″ stroke, the machine carries honing heads ranging from 9½″ to 26″ diameter.

Following boring to .003″ limits, the hone removes another .010″ to .012″ to a dimensional accuracy within .001″ limits on the diameter. Main purpose of the application, however, is a smooth finish.

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The machine is push-button controlled, entirely, with the exception of manual feed control knobs for honing tool expansion.

The application of varied types of motive force—electrical, hydraulic, and pneumatic—serves excellently to illustrate the relative values of each for a particular job. The spindle is turned by electric motor. Spindle reciprocation, however, which demands a precisely timed reversing action in the vertical travel of the spindle and head, is hydraulically controlled. Table traverse for work loading and unloading is also hydraulically operated. For raising the head clear of the work, in order to move work or to change the head, quick acting pneumatic pistons trip levers, clearing the solenoid switch stops which control hydraulic spindle reciprocation, permitting the tool to be raised clear of the work. Pneumatic force is also employed to actuate work-holding clamps.

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Six electric motors mounted on the fixture supply all basic power, except that supplied to pneumatic cylinders from the factory air lines. In addition to a 50 hp motor powering the spindle, a 15 hp motor and a ½ hp motor are required to operate the hydraulic compressor and to maintain pressure control. A 1 hp unit raises the honing head guide, and a ¾ hp unit operates the lubricant pump, with a ½ hp motor distributing coolant.

The traversing table permits use of pre-loading jigs. On certain jigs, more than one workpiece can be set up by altering the dowel locating point positions.

OIL HOLES CAST IN CRANKSHAFT

A CHANGE from forging to casting the crankshaft of marine engine water pumps has made possible a reduction of from three to one hours in the time required to produce oil holes. Drilling relatively long holes, demanding elaborate work holding fixtures has been replaced by casting seamless steel tubing in the shaft, thus affording a net time-saving of 2 hours per piece.

Tubing, ½" O. D. by 3/10" I. D. is first bent to the general contours of the shaft in a drawbench operation. Next, three 3" oil outlet tubes, 5/10" O. D. by 3/32" I. D. are welded perpendicular to the axis of the bent tube, at points conforming with the location of the crankpin bearings. The only remaining drilling operation is through the ¼" wall at the juncture of these crankpin bearing outlets with the main tube.

Open tube ends are sealed by a torch welding operation. The tube is cleaned, removing all impurity, and permitting establishment of a good bond between the Meehanite casting and steel tubing. Following casting, protruding tube ends are sawed flush with the shaft surfaces.

Similarly, two straight, non-intersecting oil holes are provided in a rocker arm for a 600 hp Diesel engine. A single straight tube, bent in a punch press so that two straight sections are joined by an "S" curve, is cast in the part. The curve lies in the center portion of the arm, which is bored out to form the shaft hole.

Previously, when the rocker arm was forged, holes were drilled from each end of the arm to the central shaft hole. Because these holes lie in non-intersecting lines, casting the single tube into the arm required development of the "S" curve in the center of the tube. Boring the shaft hole on the rocker arm, which removes the "S" curve, leaves separate oil holes in each end of the arm.

Though these arms were once forged, physical requirements were satisfied entirely by the Meehanite casting, which permits elimination of two drilling operations.

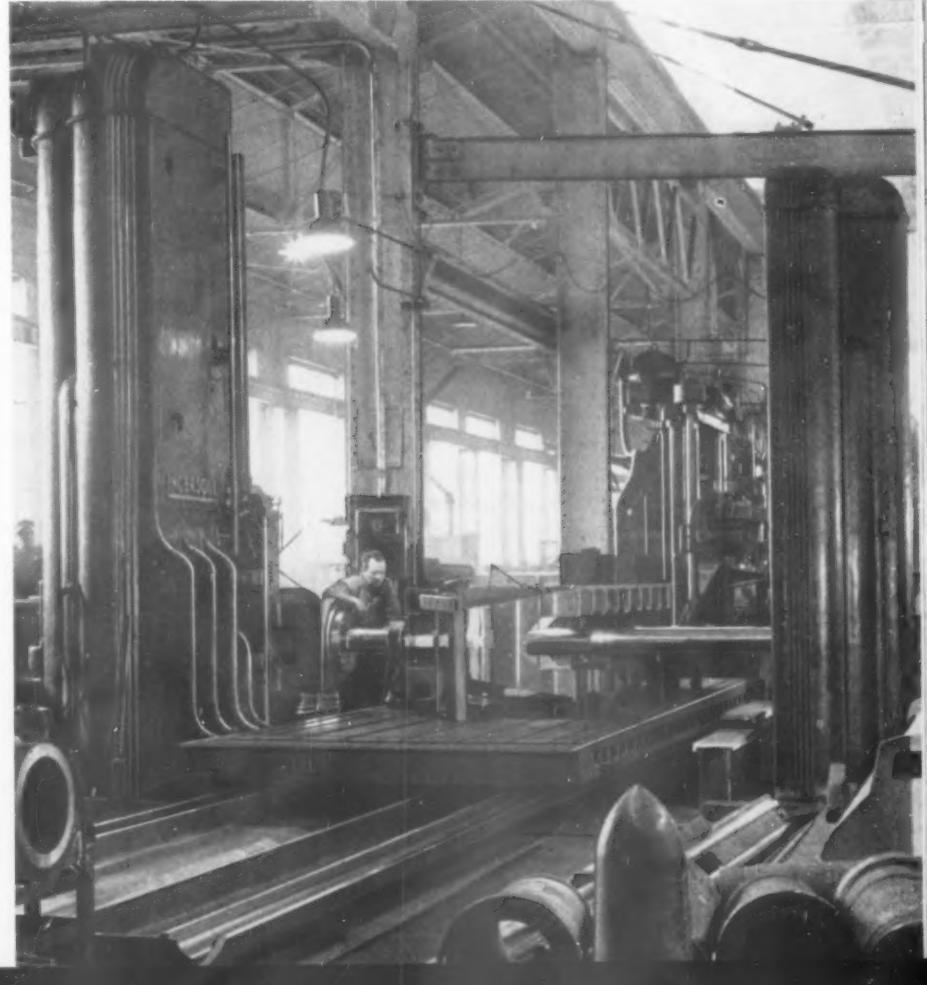
Rough cut completed, workman will install "pad" for finish cut on boring head of large open-side milling and boring machine. Multiple tool set-up has reduced boring time more than 80 per cent.

CAST BORING BARS

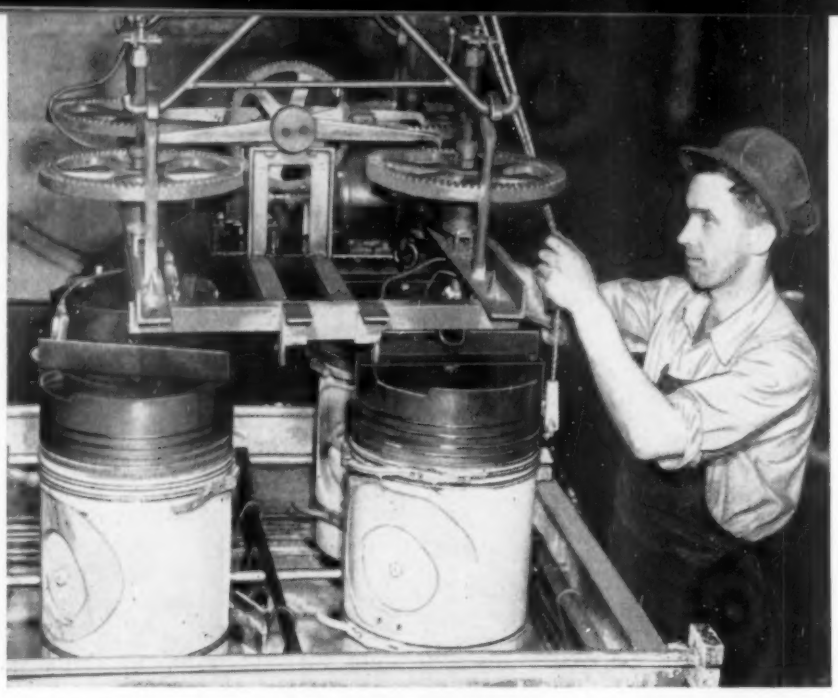
SAVING MATERIAL and construction time, and more than satisfying all physical requirements, Cooper-Bessemer is casting long boring bars from Meehanite. Design and operation of the bars is the same as for forged tools. The production engineers of this company are at present using 14′ and 16′ bars, 8″ in diameter, and a casting for a 21′ tool is on order. In finishing Meehanite bars, three normalizing cycles are required to remove strains following machining operations. A truer, straighter bore has been found to be an advantage of using the cast bars in boring cylinder blocks and crankcases.

Further boring progress has been made in maintaining set-ups of boring jigs with bars installed, and work-holding fixtures for machining cylinder liners and similar jobs. Though a small additional inventory in bars may be required, set-up time is reduced materially, and accuracy is assured. In loading work, the bar is pushed back in the jig and the work is loaded in the fixture. The bar is then run through the work and is keyed to a power spindle.

Another reduction in man-hours



Typical of permanent, multiple tool set-ups at Cooper-Bessemer plants, large open-side milling and boring machine is shown boring Diesel cylinder block. Rough and finished boring, as well as facing of the block, is performed without changing set-up.



Machine specially designed and built by Cooper-Bessemer to turn automatically four pistons at a time in 3-hour plating bath. Precise degree of turn and exact time intervals assure even application of plating. Workman, using hoist, is raising unit to remove plated pistons.

devoted to boring applications, and also increased accuracy, is achieved through the development of permanent multiple tool set-ups. A typical job, where these set-ups are used, is that of boring a Diesel cylinder block to accept a cylinder liner. The block is stepped at each end. For rough and finish cuts, "pads" with tools set for both steps, are ready to bolt on the boring heads. Time for boring a block has been reduced more than 80 per cent. An Ingersoll open-side milling and boring machine is used.

The use of cast Meehanite boring bars is but one phase of a saving of tool steels which has been effected by this company. In casting small tool shanks, milling cutter bodies, and forming tools, more than 850 tons of tool steel have been conserved. The tremendous saving has been more than that which would have been realized by the company's own tool requirements. Reason for this is that Cooper-Bessemer's success in supplying tools from less critical materials for its own machining led to offering its foundry facilities and skill to the needs of other companies.

TIN PLATING PISTONS

AN IMPORTANT AID to run-in tests on large Diesel engines has been the application of tin plating to the pistons. The soft plate permits operation of a tight motor without damage to the parts. Approximately .002" of plate is applied to the piston surface. Because of the nature of the work it performs, plating should be as even as possible.

Striving for even application, a man has been required to turn each piston in the plating tanks at frequent intervals during its three-hour bath, so that the entire surface might be exposed equally to the anode. Obviously, in addition to requiring a man's time, this method of operation could not be counted upon to produce accurate results.

To save time and improve the job, a small machine was designed and built which would turn the pistons automatically. A ¼ hp motor, mounted above a frame, is geared down to turn slowly two eccentric cranks, on opposite sides of the frame. Four ratchet bars, two extending in opposite directions from each crank, move back and forth, connecting with horizontal spur gears at each advance. The spur gears are mounted and keyed to vertical spindles which end in hooks at the bottom. Single pistons in racks, hung in the plating bath from these hooks, are turned a few degrees with each advance of the ratchet bars. Not only are man-hours saved, but the automatic turning of the pistons improves the evenness with which the plating is applied.

BEARING CLASSIFICATION SYSTEM FOR SMALL MOTORS

● Small precision-type motors are assembled with bearings previously selected to match the diameters of the fits at one of General Electric's plants.

New ball bearings are checked on a series of pin gages to classify them according to inside diameter. Gages, in .0001" steps, spread over the tolerance of the size of the bearing fit on the rotor shafts. About four gages or pins are necessary; after each bearing is tried, it is placed in a tray marked with the size of the pin on which it was a snug fit. For a loose fit or a press fit, the bearing is simply placed in a tray identified with the pin. These bearings are checked on a comparator for outside diameter and placed in rows according to .0001" variation.

A comparator plug gage is used to determine the size of the bearing seat in the end shields. Not only is the suitable bearing chosen from the correct row in the tray, but the particular tray identification is noted.

Shafts of rotor cores are also selected. Each fit is checked with a series of tungsten carbide ring gages .0001" different in size. The proper shaft is chosen to fit the bearing.

With the bearings classified according to O.D. and I.D., the proper size for both the shaft and the end shield can be chosen, and the assembled unit has the desired accuracy. Any type or combination of fits can be obtained.

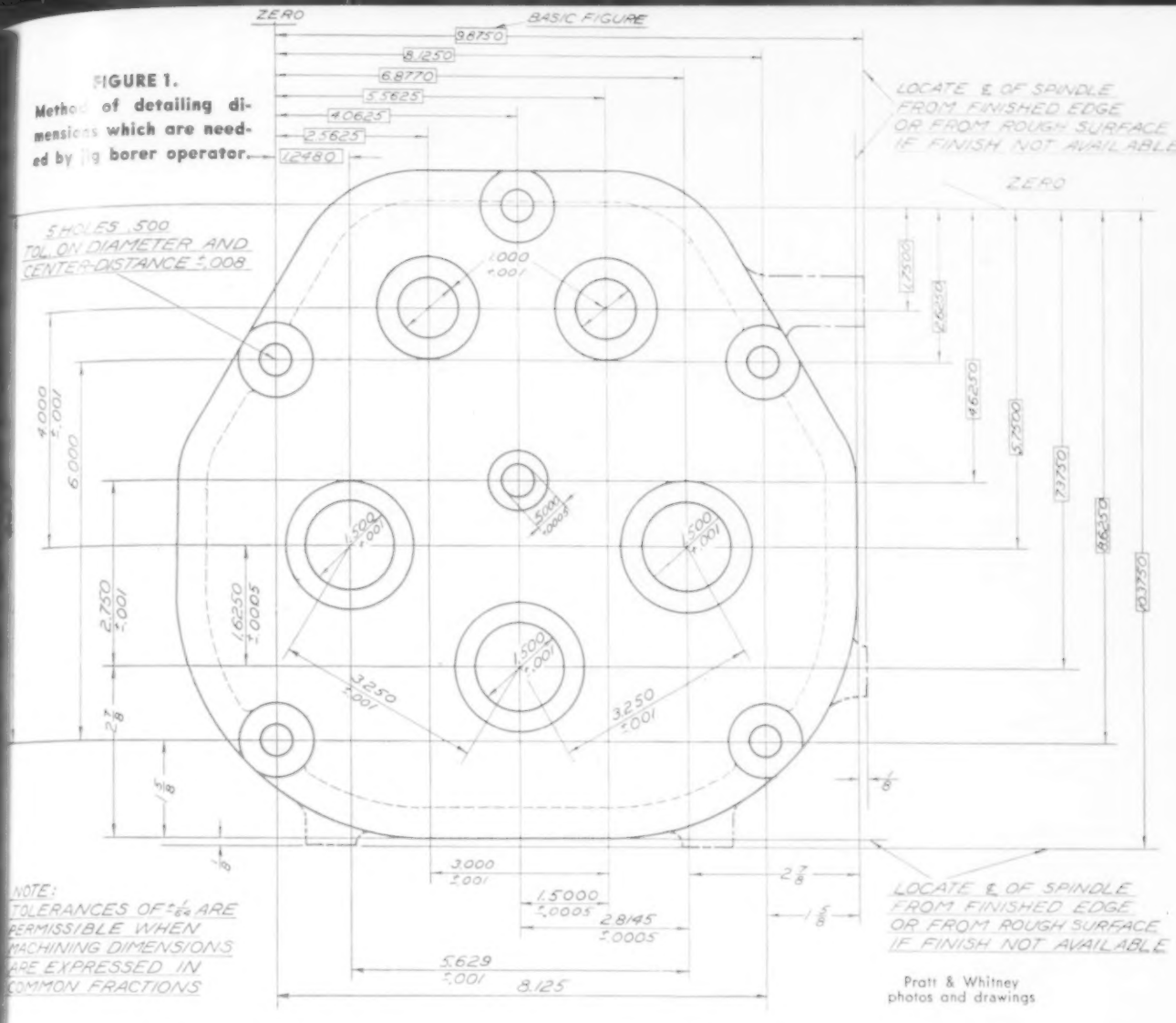


FIGURE 1. Method of detailing dimensions which are needed by jig borer operator.

Pratt & Whitney photos and drawings

Jig Boring at Full Capacity

FRANK O. HOAGLAND
MASTER MECHANIC
PRATT & WHITNEY

Are you getting efficient, full-time operation from the jig borer? What a working drawing should contain, why expansion affects tolerances, how the rotary table is used, and how the jig borer can serve as an inspection tool, are pointers to economical production.

IN THESE TIMES of high production requirements, full advantage should be taken of the productivity of the jig borer. Giving the operator the opportunity to run it at capacity is one of the most direct methods of realizing its benefit.

To bring this about, he must be supplied with more than the usual cutting tools and gages. Working drawings should be so complete that he will not find it necessary to perform additions, subtractions, and trigonometrical calculations that can be better taken care of in the engineering department.

On component drawings of machines, fixtures, and gages, where accurate dimensions between holes are required for gear centers and so forth, it is common practice to show the distance between the holes in a direct line between the holes. Frequently these lines are not parallel with or at right angles to the working edges of the job under consideration.

When the job is swung up on the faceplate of the lathe and the holes are located by the "Button" method, the manner of indicating dimensions makes little difference. But when such work is to be done on a jig borer, it is essential that dimensions are also furnished which will enable the operator to locate the work progressively under the cutter spindle, using the measuring instruments on the right angle slides provided for that purpose. The direct line dimensions and working tolerances between the holes are useful for checking the work as it progresses and for final inspection.

Generally, a discussion of this subject with the jig borer operator will not prove satisfactory, because

NO. OF HOLE	DEGREE OF HOLE DEG.	MIN.	SECONDS
	29 DIVISIONS		
1	0		
2	12	24	49-19/29
3	24	49	39- 9/29
4	37	14	28-28/29
5	49	39	18-18/29
6	62	4	8- 8/29
7	74	28	57-27/29
8	86	53	47-17/29
9	99	18	37- 7/29
10	111	43	26-26/29
11	124	8	16-16/29
12	136	33	6- 6/29
13	148	57	55-25/29
14	161	22	45-15/29
15	173	47	35- 5/29
16	186	12	24-24/29
17	198	37	14-14/29
18	211	2	4- 4/29
19	223	26	53-23/29
20	235	51	43-13/29
21	248	16	33- 3/29
22	260	41	22-22/29
23	273	6	12-12/29
24	285	31	2- 2/29
25	297	55	51-21/29
26	310	20	41-11/29
27	322	45	31- 1/29
28	335	10	20-20/29
29	347	35	10-10/29

NO. OF HOLE	DEGREE OF HOLE DEG.	MIN.	SECONDS
	30 DIVISIONS		
1	0	0	0
2	12	0	0
3	24	0	0
4	36	0	0
5	48	0	0
6	60	0	0
7	72	0	0
8	84	0	0
9	96	0	0
10	108	0	0
11	120	0	0
12	132	0	0
13	144	0	0
14	156	0	0
15	168	0	0
16	180	0	0
17	192	0	0
18	204	0	0
19	216	0	0
20	228	0	0
21	240	0	0
22	252	0	0
23	264	0	0
24	276	0	0
25	288	0	0
26	300	0	0
27	312	0	0
28	324	0	0
29	336	0	0
30	348	0	0

FIGURE 2. Tables for 29 and 30 divisions of the circle, as presented in the Angular Circle Indexing Calculations, containing from two to 100 divisions.

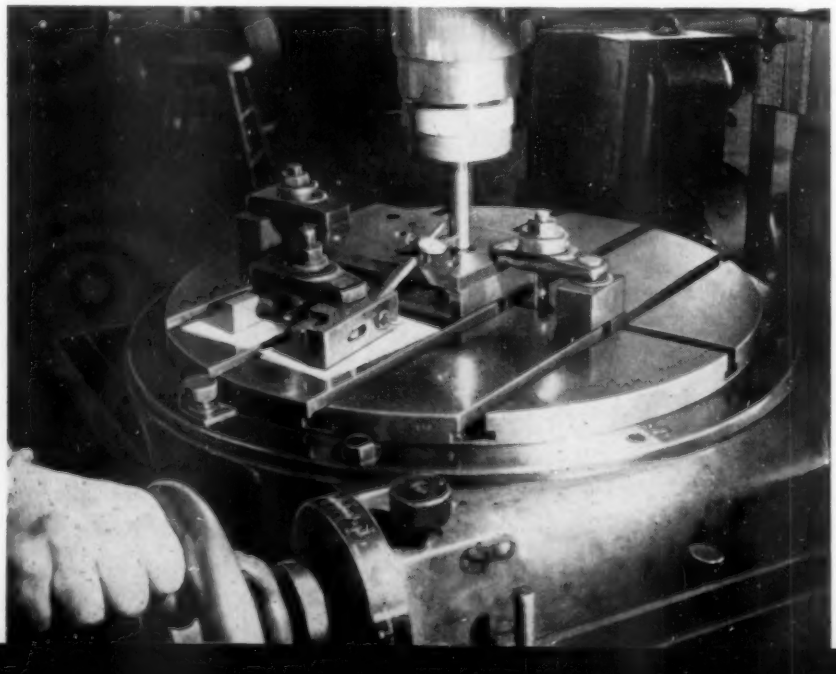
he does not always drill and bore the holes in the same sequence on different jobs. He prefers to do each job in the most convenient manner. For example, to pick up and bore all holes of the same diameter, even if they are not adjacent to each other, while he has the boring tool in the cutter spindle saves unnecessary tool changes.

Consequently, the uncertainty of the sequence of drilling and boring the holes has complicated the issue of indicating on the drawing the necessary dimensions for setting the measuring instruments on the jig borer. The fact that these dimensions must read in the opposite direction to that of the graduations and numerals on the measuring instruments on the right angle slides of the jig borer has also contributed to the confusion.

Few tool engineers realize that after the jig borer operator has mounted the work on the platen of the jig borer and established his zero points on the measuring instruments, it is necessary for him to know the distances from the zero points to each hole in order to progressively place the work under the cutter spindle. To specify the distances from hole to hole is not sufficient information, because he cannot very well establish new zero points on the measuring instruments each time he moves the work to a new location under the cutter spindle.

Of course, an effort is demanded of the production or tool engineer who must make the necessary calculations and incorporate them on the working drawings. But it is more costly to leave it to the jig borer operator to translate the figures on the drawing into dimensions that he can use and must have to do his work.

FIGURE 3. Aligning pivot of rotary table with the cutter spindle.



SAVES OPERATOR'S TIME

First, he has no magic way of producing these dimensions, and the jig borer stands idle while he attends to the necessary mathematics—amounting to an hour or two during a day's run. Second, there is nobody to check his figures and catch the errors before the work is rejected by the inspector. The dimensions for progressively locating the work under the cutter spindle should emanate from one selected zero line to the left, and from another zero line at the top of the work as viewed on the drawing board.

The operator can then keep the drawing "right side up" for reference while setting the measuring instruments on the jig borer. These instruments are in fixed positions on the machine and cannot be turned end for end or inside out to suit a drawing where the dimensions between the holes to be bored are shown in some other manner, as from hole to hole, diagonally across the work, or in opposite directions from a center line.

Where a large number of holes are to be bored in the same plate, it has been found advantageous to number the holes consecutively and tabulate the distances from the zero lines to the holes in both directions.

Where the location of each individual hole has been indicated from the common zero lines, the operator is at liberty to drill and bore the holes in any sequence that he finds most advantageous—and without worrying about the correctness of figures on odd pieces of paper lying about the machine.

It should be evident that time saved in the drafting room by omitting the

dimensions for setting the jig borer measuring instruments is in reality false economy. As a matter of fact, it increases the overall cost of the job.

Justification for working tolerances is also important. Because of the high degree of accuracy of which the jig borer is capable, its operation has become synonymous with close working tolerances. Frequently, the limits demanded are closer than are actually required for the job.

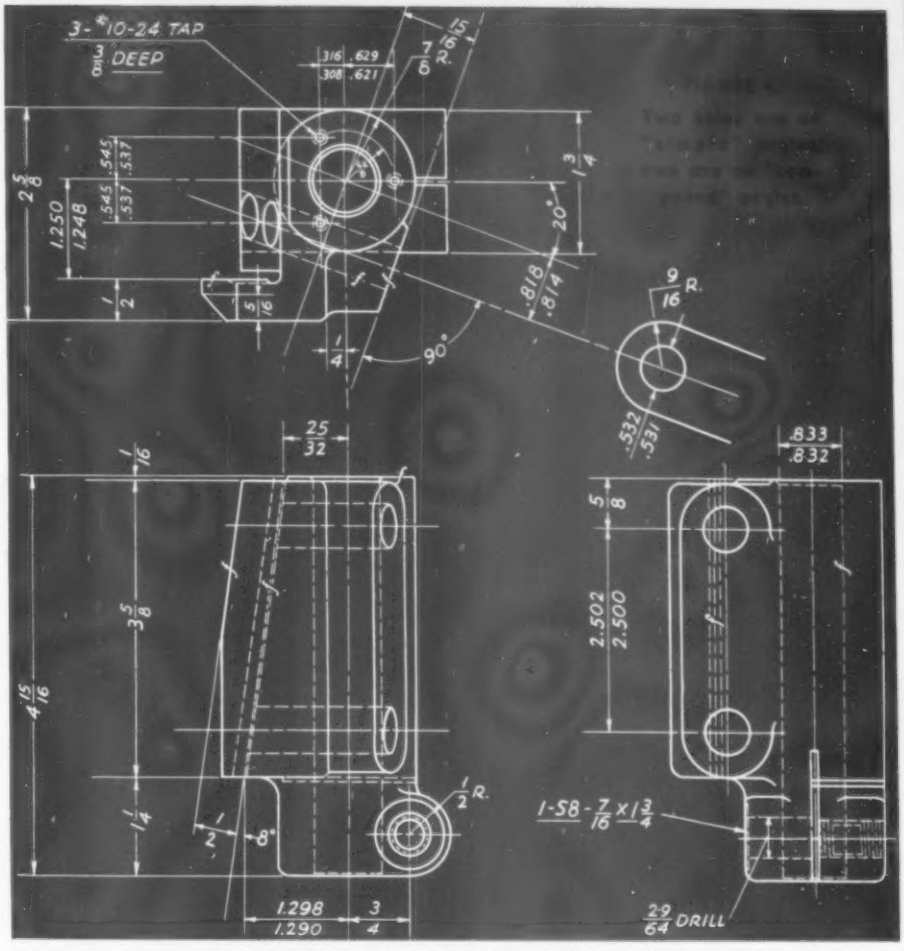
EFFECT OF HEAT

When establishing tolerances for jig boring, it should be realized that heat generated while drilling and boring affects the distance between the holes in the work. For example, the co-efficient of expansion of iron and steel is about .000006″ per inch, per degree Fahrenheit. At a room temperature of 70° F, it is difficult to prevent the temperature of the work from reaching 80° F.

On a pair of holes 10″ apart, this increase in temperature results in a .0006″ expansion. The most careful setting of the work and the measuring instruments, or the sharpness of the drill and boring tool cannot prevent it. In other words, this expansion is somewhat beyond the control of the jig borer operator. In regular jig boring practice, the working tolerances should be large enough to absorb this factor, increasing progressively in proportion to the distance between the holes being bored.

The dial on the rotary table is graduated in seconds of arc, but that is not a good reason for specifying tolerances of angles or ordinary drill jigs to a few seconds of arc—even engineers working on a 200″ telescope have allowed a tolerance of 5 seconds of arc in the worm and worm gear of this precision instrument.

Figure 1 shows a hypothetical illustration of a typical part such as might be produced in small quantities on a jig borer, or as might be incorporated as part of a drill jig. The dimensions are those which will be needed for the jig borer and the subsequent inspection.



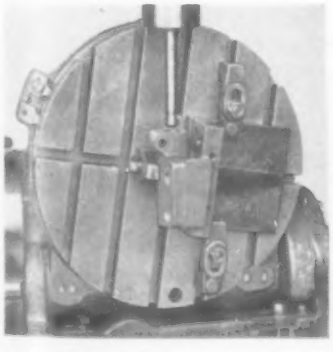
On the drawing, the dimensions enclosed by rectangles are basic figures and do not show working tolerances. These are the dimensions the operator uses to set the built-in measuring instruments on the machine. The dimensions not enclosed in rectangles show the required distances between the holes and working tolerances.

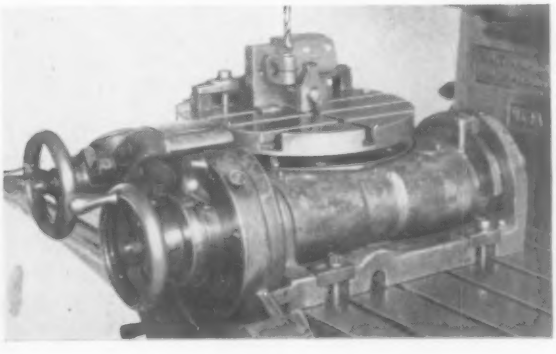
One of the problems frequently encountered in jig boring is the location and boring of holes equally spaced on the circumference of a circle. The easiest way to do this is to use the auxiliary rotary table and to calculate dimensions with polar coordinates. The calculations are quite tedious, but have been greatly simplified by the recent publication of angular circle indexing calculations, containing tables of the degrees, minutes, and seconds required for from 2 to 100 divisions.

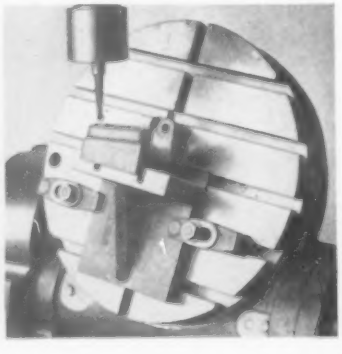
Figure 2 shows the tables for 29 and 30 divisions of the circle.

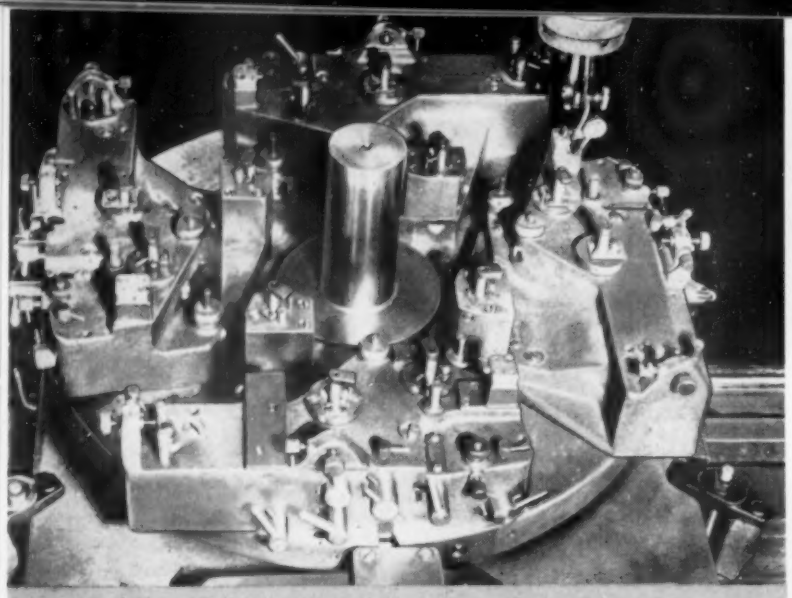
These tabulations enable the operator to definitely locate the angular position of each hole on the graduated dial of the rotary table. They also permit him to drill and bore holes in the work in any sequence he may

FIGURES 5, 6, and 7. Use of the rotary table permits jig boring work laid out in Figure 4 in one setting.









Above: FIGURE 8. Substituting a dial indicator for cutting tool converts the jig borer into useful inspection instrument.

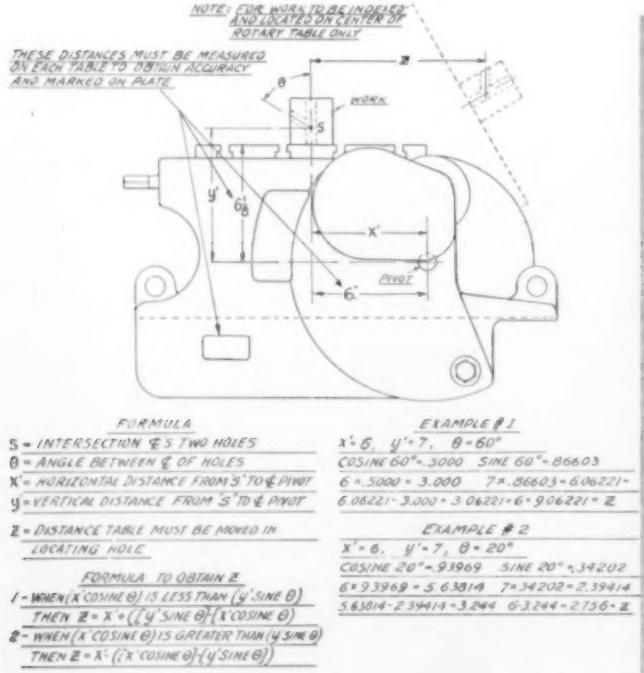
Right: FIGURE 9. Using the jig borer to check the assembly of a four-station indexing table.

select, so as to relieve strains and distribute the heat generated by the cutting tool.

When using the rotary table for spacing holes with dimensions calculated by polar coordinates and when close tolerances are specified to the center hole, it is important that the pivot of the rotary table be located in true alignment with the cutter spindle.

This can be done by clamping an indicator to the table and rotating it around a slowly-revolving proving bar held in the cutter spindle, thereby tramming the ways of the rotary table with the cutter spindle bearings. It is well to keep the indicator on about the same level as that of the hole to be bored in the work, as shown in Figure 3.

When boring holes on "simple" angles, the working surface of the job can be placed against the platen of the rotary table, but when some of the holes are to be bored on "compound" angles, it is essential to place the working surface at a right angle to the platen. This avoids a great deal of unnecessary calculation for locating the work in the correct position under the cutter spindle.



FORMULA

S = INTERSECTION ℄S TWO HOLES
θ = ANGLE BETWEEN ℄ OF HOLES
x' = HORIZONTAL DISTANCE FROM 'S' TO ℄ PIVOT
y' = VERTICAL DISTANCE FROM 'S' TO ℄ PIVOT
Z = DISTANCE TABLE MUST BE MOVED IN LOCATING HOLE

FORMULA TO OBTAIN Z

1 - WHEN (x' COSINE θ) IS LESS THAN (y' SINE θ)
THEN Z = X' + ([y' SINE θ] - [x' COSINE θ])
2 - WHEN (x' COSINE θ) IS GREATER THAN (y SINE θ)
THEN Z = X' - ([x' COSINE θ] - [y' SINE θ])

EXAMPLE # 1

x' = 6, y' = 7, θ = 60°
COSINE 60° = .5000 SINE 60° = .86603
6 × .5000 = 3.000 7 × .86603 = 6.06221
6.06221 - 3.000 = 3.06221 = 6 + .06221 = Z

EXAMPLE # 2

x' = 6, y' = 7, θ = 20°
COSINE 20° = .93969 SINE 20° = .34202
6 × .93969 = 5.63814 7 × .34202 = 2.39414
5.63814 - 2.39414 = 3.244 6 - 3.244 = 2.756 = Z

DATA SHEET A.

Locating work centered on tilting rotary table.

Figure 4 shows a job where two of the holes are on "simple" angles and the other two are on "compound" angles. Figures 5, 6, and 7 show how it was jig bored in one setting, using the rotary tilting table.

The procedure is as follows:

1. Locate the center of the tilting rotary table (while horizontal) under the center of the spindle and establish this position on the machine measuring instruments.

2. Strap one side of the work to the table top (horizontal), lining it up accurately with the base lines of the angles specified for the hole to be bored.

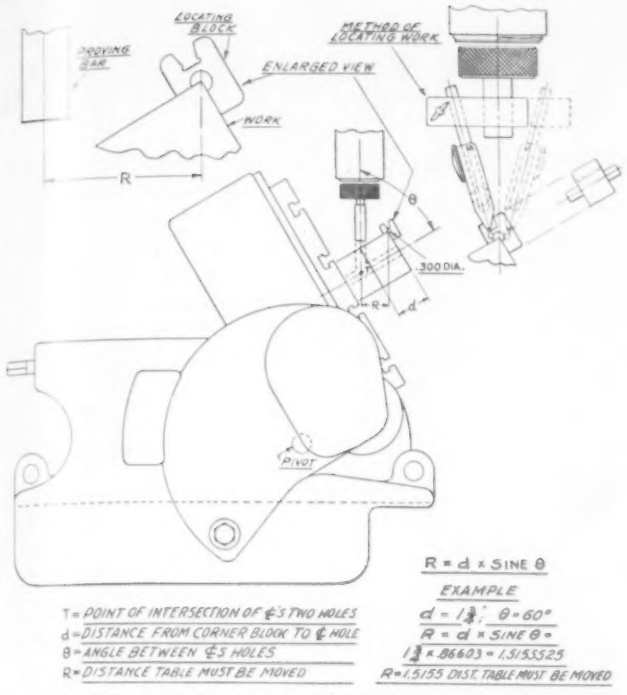
3. Rotate the table to the specified angle in this plane, placing the center line of the hole at a right angle to the rotary table pivot. Then move the table sidewise until the center line of the hole to be bored intersects the center line of the spindle in this plane.

4. Tilt the rotary table to the specified angle in the other plane, placing the center line of the desired hole parallel with the spindle. Then move the table endwise until the center line of the hole is in true line with the spindle.

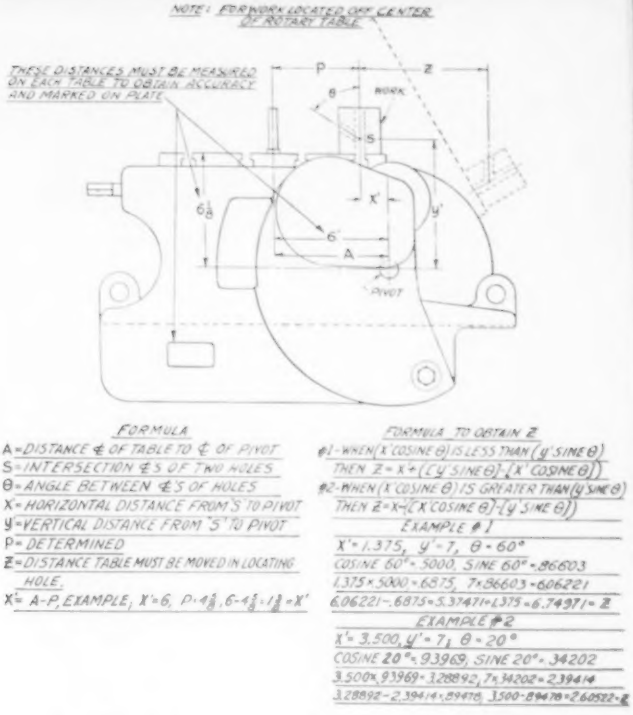
Data sheets A, B, and C show in detail how to determine the distance the table must be moved.

●

For boring the hole on a "simple" angle, as shown in Figure 5, the table has been rotated to the required angle


LOCATING BLOCK
METHOD OF LOCATING WORK
MOVING BAR
ENLARGED VIEW
WORK
R
θ
.300 DIA.
d
PIVOT
T = POINT OF INTERSECTION OF ℄S TWO HOLES
d = DISTANCE FROM CORNER BLOCK TO ℄ HOLE
θ = ANGLE BETWEEN ℄S HOLES
R = DISTANCE TABLE MUST BE MOVED
R = d × SINE θ
EXAMPLE
d = 1 3/4"; θ = 60°
R = d × SINE θ =
1 3/4 × .86603 = 1.51555525
R = 1.5155 DIST. TABLE MUST BE MOVED

Data Sheet B. Locating work with indicators on rotary table.


NOTE: FOR WORK LOCATED OFF CENTER OF ROTARY TABLE
THESE DISTANCES MUST BE MEASURED ON EACH TABLE TO OBTAIN ACCURACY AND MARKED ON PLATE
P
Z
θ
WORK
S
X'
y'
6
A
PIVOT
FORMULA
A = DISTANCE ℄ OF TABLE TO ℄ OF PIVOT
S = INTERSECTION ℄S OF TWO HOLES
θ = ANGLE BETWEEN ℄S OF HOLES
X' = HORIZONTAL DISTANCE FROM 'S' TO PIVOT
y' = VERTICAL DISTANCE FROM 'S' TO PIVOT
P = DETERMINED
Z = DISTANCE TABLE MUST BE MOVED IN LOCATING HOLE.
X' = A-P, EXAMPLE, X' = 6, P = 4 3/8, 6 - 4 3/8 = 1 5/8 = X'
FORMULA TO OBTAIN Z
#1 - WHEN (X' COSINE θ) IS LESS THAN (y' SINE θ)
THEN Z = X + [(y' SINE θ) - (X' COSINE θ)]
#2 - WHEN (X' COSINE θ) IS GREATER THAN (y' SINE θ)
THEN Z = X - [(X' COSINE θ) - (y' SINE θ)]
EXAMPLE #1
X' = 1.375, y' = 7, θ = 60°
COSINE 60° = .5000, SINE 60° = .86603
1.375 × .5000 = .6875, 7 × .86603 = 6.06221
6.06221 - .6875 = 5.37471 + 1.375 = 6.74971 = Z
EXAMPLE #2
X' = 3.500, y' = 7, θ = 20°
COSINE 20° = .93969, SINE 20° = .34202
3.500 × .93969 = 3.28892, 7 × .34202 = 2.39414
3.28892 - 2.39414 = .89478, 3.500 - .89478 = 2.60522 = Z

Data Sheet C. Locating work off center on tilting rotary table.

in one direction and is perpendicular in the other direction; whereas in Figure 7, the table has been rotated in one direction and tilted in the other direction so the holes can be bored on the specified "compound" angles.

The jig borer is in reality a measuring machine provided with facilities for drilling, reaming, and boring in pre-determined positions. If, therefore, a dial indicator is substituted for the cutting tool, as shown in Figure 8, the jig borer becomes a very useful instrument for the inspector to check the work after boring, but before it is removed from the machine, thereby saving many a costly set-up in the inspection department.

The jig borer can also be used to advantage for assembling and checking units. An example is the four-station indexing table for an automatic machine, shown in Figure 9.

THE END

Automatic Tapping Machine Speeds Production, Increases Tool Life

TWO VERTICAL automatic tapping machines replacing a double-spindle, manually-operated horizontal machine resulted in 300 per cent more production on turnbuckles made by the Edward W. Daniel Company, Cleveland.

The machines are a heavy-duty, lead-screw type. They are equipped with a special casting mounted on the column to hold a fixture designed by the user.

The fixture holds two turnbuckles, one being tapped while the other is pre-loaded. Operated in tandem, one machine taps left-hand threads, the other taps right-hand threads which are readily identified in assembly by a trademark on one end of the turnbuckle.

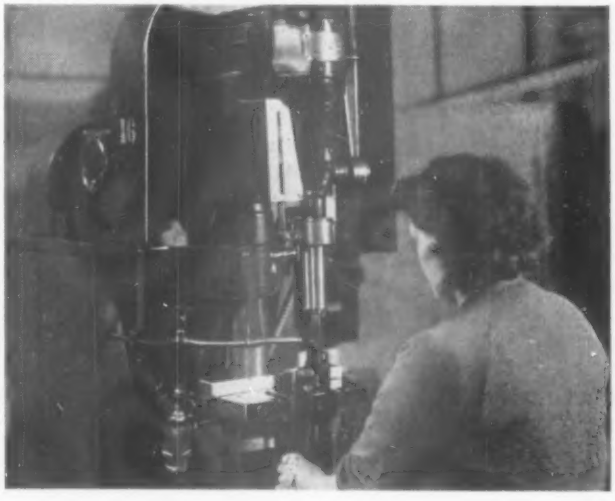
The previously-used horizontal machine tapped through the turnbuckle, dropping the tap out of its holder to be reinserted for the next operation. Much time is now saved by the automatic action which simply reverses the tap through the hole.

Tap wear has been decreased, and breakage caused by stress of operation has been eliminated. Accuracy (Number 2 fit) has been improved. These advantages are the result of lead screw application, which provides absolutely uniform tapping speeds and pressures. As many as 10,000 holes per tap have been recorded.

It is possible to estimate accurately the time required for a job. Knowing it takes 16 seconds to tap a 1-¼" hole in a turnbuckle makes it simple to figure the time needed to tap a thousand. The human element is virtually eliminated.

Several sizes of turnbuckle are being made, with holes 5/8", 1", and 1-¼" diameter. They are drop-forged steel, which is usually considered heavy work for an automatic tapper.

Cleveland Tapping Machine photo



Sawing Fixtures Ups Output 933%

Production snag, which threatened fulfillment of a sub-contract, relieved by ingenious, low-cost tooling

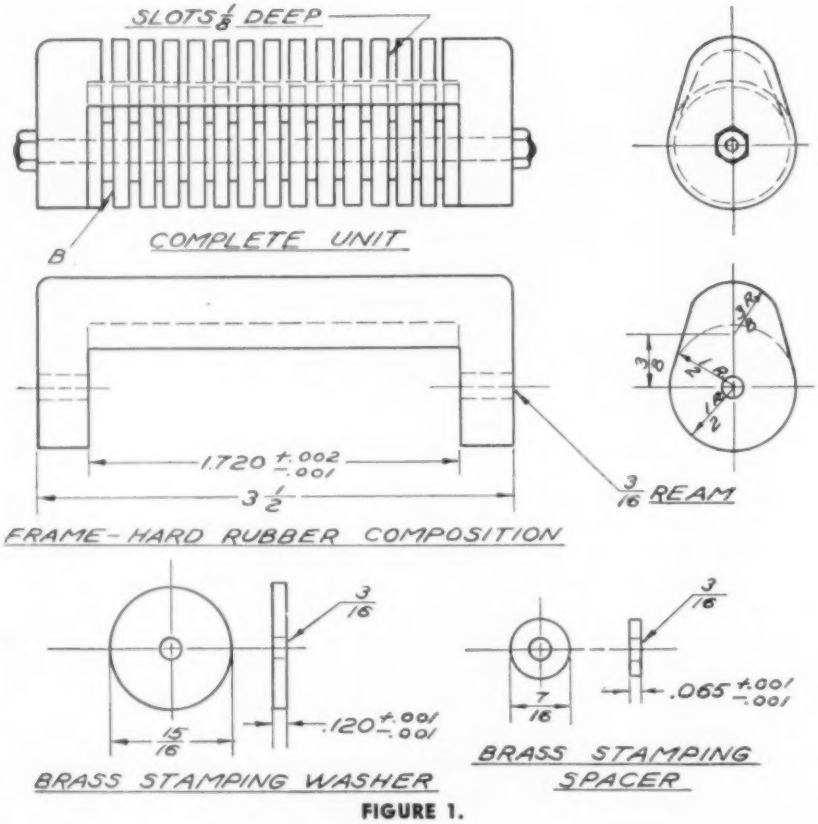


FIGURE 1.

MANY MANUFACTURERS of a single type peacetime article found that switching to war production has posed problems entirely foreign to their former methods. The examples of how they overcame production difficulties and lowered costs are, of course, legion.

A good case in point is that of one manufacturer, practically put out of business by war restrictions, who received a sub-contract for production of the unit shown in Figure 1.

Specifications stated all spacers must be the same size, but that some units would require from 10 to 15 washers of varying thicknesses. Manufacture of these washers and spacers did not constitute a particularly difficult problem because the company had on hand the punch presses required. The necessary number of spacers and washers were assembled in a hard rubber frame furnished by the prime contractor.

In the next operation, however, production struck a snag. Plans called for the machining of .065" slots in the frame in line with the brass spacers. This was first attempted by clamping the frame in a vise and cutting the slots with a hand saw. However, the best production possible per operator was 18 units in eight hours.

The problem was licked by company engineers who designed a sawing fixture mounted on the table of a small sawing machine and held in position with two bolts in the fixture slots. The fixture, made of machine steel, is shown in Figure 2.

With this fixture one woman operator can machine the slots in from 20 to 22 units an hour, more than was possible in an eight-hour day by the hand method.

The saw, .0625" (1/16") thick travels through the slot of the fixture. The thickness of the saw produces slots in the unit near enough to dimensions called for in the detail to be acceptable. The saw projects 1/8" from the 25/64" radius of the fixture, and an adjustable guide or locating blade "A" projects 7/64" from the same surface.

When setting the machine, the operator moves the blade into position so that "X" equals the thickness of the washers being used in the unit to be slotted.

To perform the slotting operation, the saw is started and the first slot at the left is made by revolving the unit in the 25/64" radius until the saw is in the space "B". The unit is then moved along to the left until the locating blade enters the slot just machined in the frame. By again revolving the unit in the radius, the next slot is machined. The procedure is repeated until all slotting is completed.

When a different thickness of washer is used in the unit, it is necessary only to adjust the locating blade so that "X" equals the thickness of the washers used. THE END

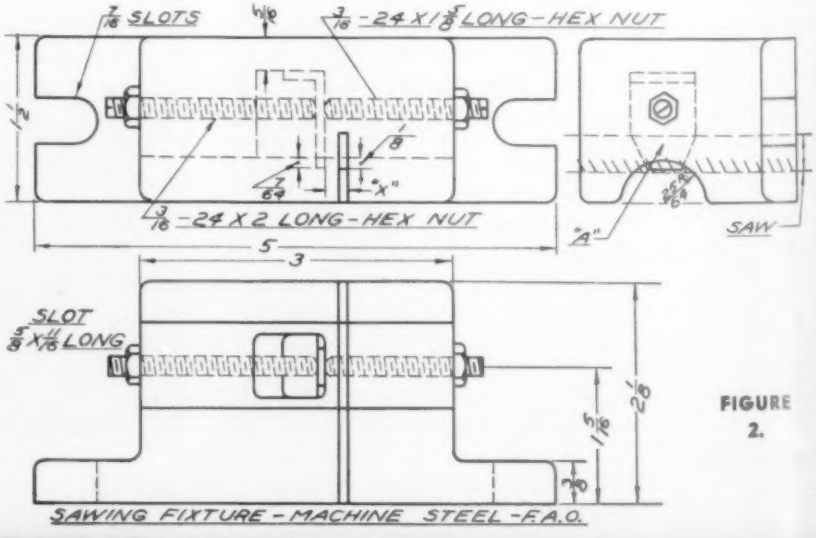
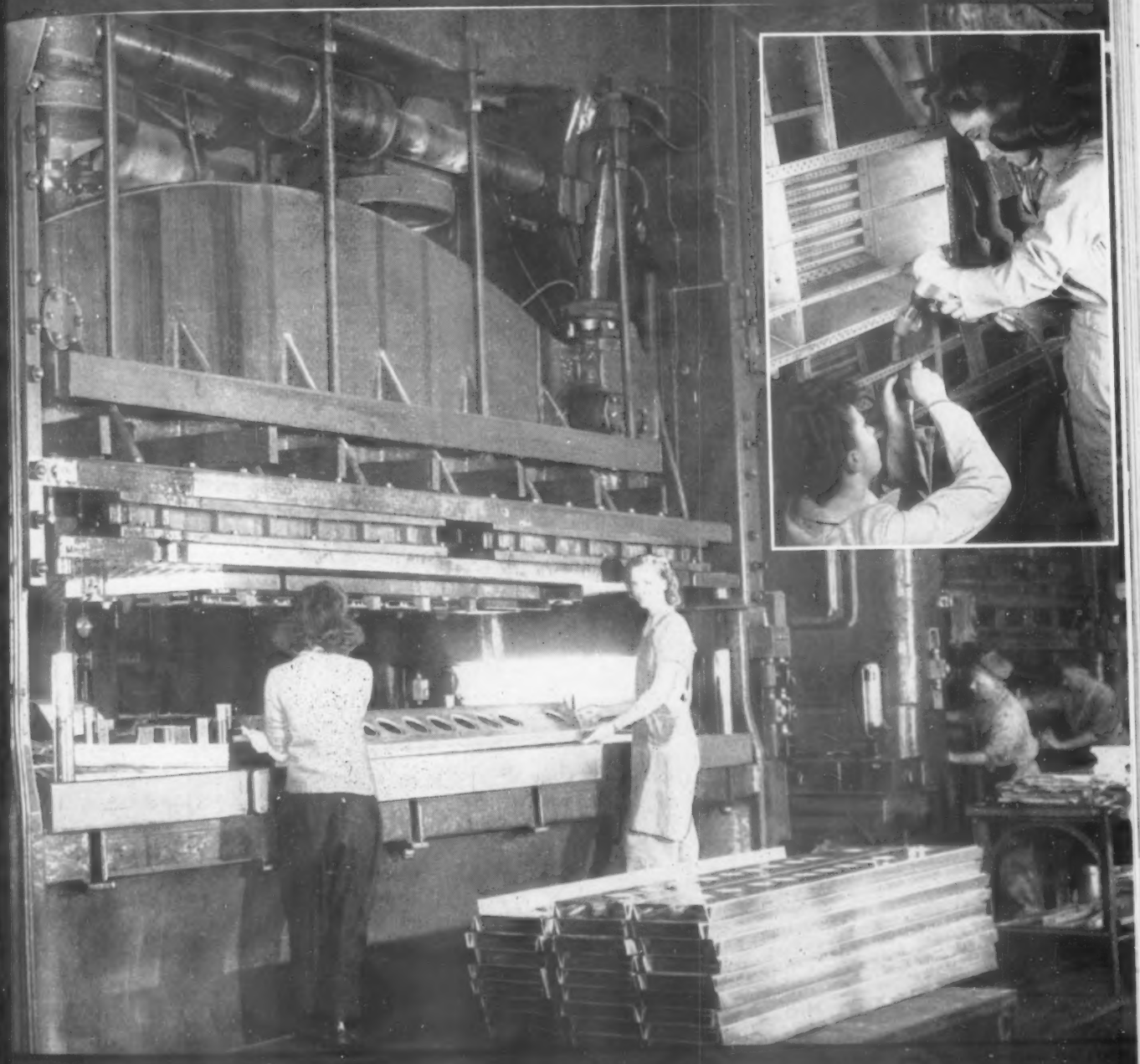


FIGURE 2.

PRODUCTION

MACHINE AND TOOL ENGINEERING



Streamlined Production

Improved Production Know-How in the Aircraft Industry Is Typified by Smart Tooling of Four Companies

WHAT is this war-time American aircraft industry that blackens the sky over Europe and erupts the island empire of Japan into the Pacific? Primarily, it is the much expanded airplane manufacturer who builds fuselages, engines, and propellers. But, much of its volume and production ideas come from such sources as the automobile hardware maker who builds aircraft instruments to ten-thousandths, and a body manufacturer who fabricates wings on a conveyer line. It is also large and small tool and die shops, machine tool builders, press manufacturers, rubber companies, and railroad car builders.

This industry's technological progress has made possible a production schedule of 100,000 planes for 1944—50 per cent more than were built in 1943.

From every salient of the aircraft production front have come improvements to manufacturing techniques which will undoubtedly benefit many industries. The design of presses and dies permitting deep-drawing and stretch-forming of aluminum on a production basis has provided notable progress. High-speed milling calls for feeds and speeds which have proved to be just as practicable as they sounded fantastic.

Related to plane output, production savings mark a new high in America's ability to produce with a low supply of the particular skills required, and in the face of rapidly changing design, production equipment has been standardized to do the job.

MAN-HOURS DECREASE 72 PER CENT

HERE ARE RESULTS on the man-hour requirement, as reported by the Aircraft War Production Council, Inc.

"In building a typical four engine bomber:

1ST	BOMBER	REQUIRED	200,000 MAN-HOURS
2ND	"	"	187,500 "
20TH	"	"	137,500 "
100TH	"	"	87,500 "
300TH	"	"	50,500 "
1000TH	"	"	22,500 "
2000TH	"	"	13,000 "

"The same savings were shown in building fighter planes. The first typical plane to come from the production lines, Model "A", took 157,000 man-hours.

"Tenth plane of that model took 59,000 man-hours. By that time, the engineers were beginning to discover ways and means to improve the ship, so the 13th plane was a slightly revised model—Model "B"—which still took 59,000 man-hours to build.

"Despite design and model changes, and changes in specifications, the 100th plane took only 26,500 man-hours to build, and the 1000th, only 7,800 man-hours... There was a 72 per cent decrease in the man-hours required each time production was doubled."

Thus it is expected that this year's 50 per cent increase may be achieved with small increases in man-power if the industry continues its strides.

Despite the peculiar problems of aircraft production, much of the progress is broadly applicable, possibly because of the heterogeneous aspect of the industries and industrialists which color the present picture.

FUSELAGE FABRICATION

PAST ISSUES of THE TOOL ENGINEER have reported the activities of such representatives of the industry as Bell, Boeing, Curtiss-Wright, Consolidated-Vultee, Lockheed, and Wright Aeronautical. Certain features presented the details of outstanding plane parts manufacture as conducted by industry associates. Last month, the Goodyear company was featured for its development of the Roto-Stretcher. An earlier "Streamlined Production" section described the highly automatic special machines which produce engines, pointing to the intensified application of known techniques which has made high production possible.

Fuselage fabrication has been a balky horse of another color, however. It is with this phase of plane manufacture that the following pages deal. Selected for description at this time are highlight activities of four aircraft companies: North American Aviation, Inc., Eastern Aircraft Division of General Motors, Northrop Aircraft, Inc., and Southern Aircraft Corporation.

Outstanding ideas at any other time, the forming, machining, and assembly methods described here are typical of day to day and week to week improvements.

Though incidental to the continuing struggle for victory, great future importance must be attached to the new tools and techniques with which American industry has been armed. When an aircraft industry finally emerges as that and nothing else, and an automobile industry and a refrigeration industry do the same, each will have benefited from the war-time association in plane building. As never before, manufacturers will be prepared to meet changing design requirements, to produce more per man-hour, and to form and machine new and useful alloys on a mass-production basis.

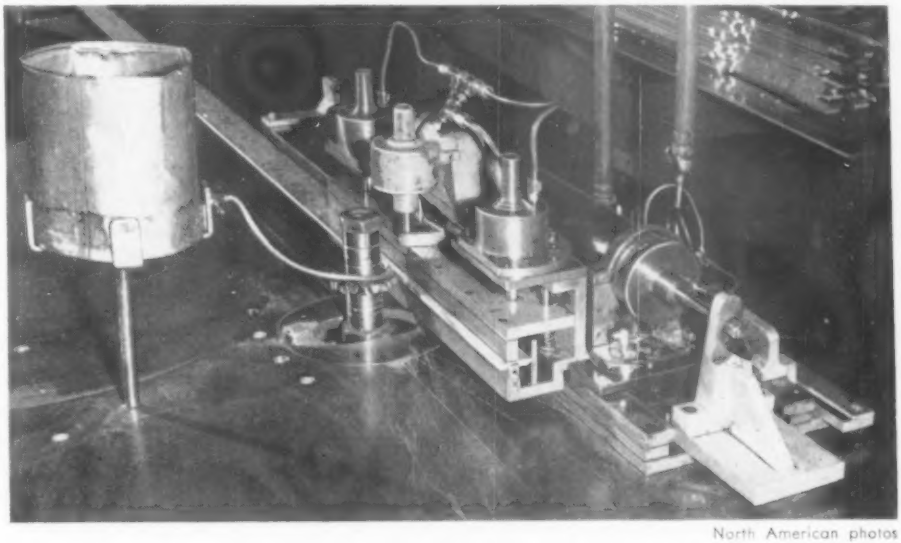
SPECIAL FEATURE BY THE EDITORS

Machining, Forming, and Riveting Methods

North American Aviation, Inc., improves fabricating techniques by increasing the adaptability of equipment and lowering the skilled man-power requirement

MILLING EXTRUSIONS

MASS PRODUCTION in milling airplane parts from extrusions has become feasible at North American Aviation, Inc., by application of a traverse feeder in conjunction with a vertical milling machine. Heretofore, the problem had been complicated by need for increasing production while replacing skilled men with unskilled help.



North American photos

Prior to installation of this machine, specially constructed jigs and set-ups of blocks and shims were used by the operators under supervision. As a temporary arrangement, these served only to maintain production schedules, but did not increase output.

The problem was finally solved by the manufacturing tool research department. The traverse feeder obtains accuracy of parts in unprecedented production, and it enables unskilled operators to run the machine according to simple instructions.

The production features of this machine are:

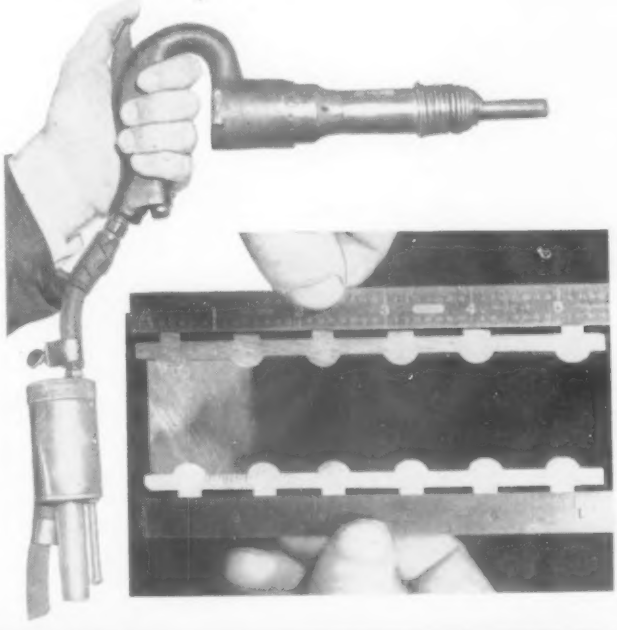
Reciprocating action with variable speeds in both directions enables the operator to obtain the proper feed for cutting into the extrusions.

Forward travel of the carriage may be adjusted to any desired length up to 18", and is accurate to within any specified tolerance.

The jaws are easily adjusted for clamping various types of extrusions, and parts are quickly loaded and unloaded, adding to potential machine time.

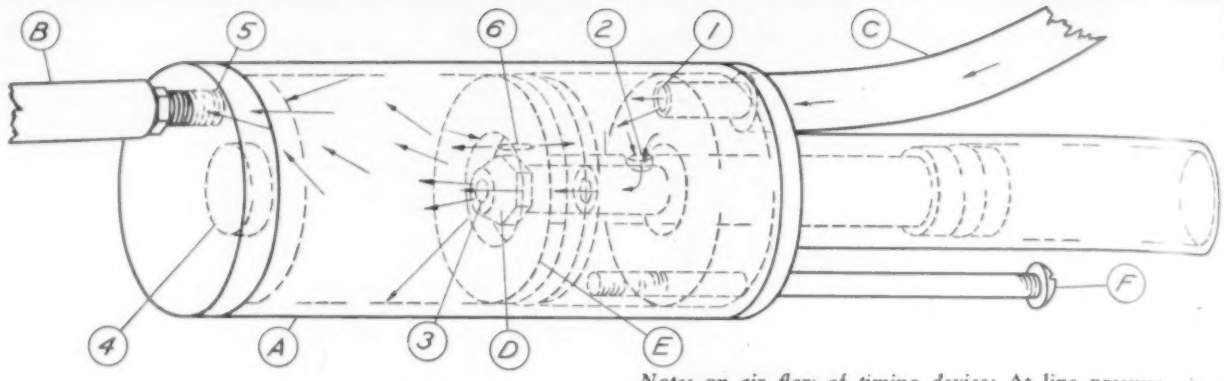
AUTOMATIC RIVETING TIMER

UNDER pre-determined pressure, rivets can be driven easily and accurately into aircraft structures. This has been made possible by the development of an automatic timer. The device is, in fact, applicable to all pneumatic tools requiring timing, regardless of their size, including countersinking, drilling and punching. It is placed in the airline above the tool, and the operator proceeds as usual, though freed from figuring timing.



Rivet-driving time is set by adjusting a screw against a "spud" which travels within the cylinder. An orifice in the spud, closes when it strikes a plastic stop, and permits pressure to become equalized on both sides of the spud. Because of the greater pressure on the downstream side, the piston returns to normal position, and the device reloads automatically.

Ben Kruce, tool research engineer for North American, who developed the timer, says: "Wherever pneumatic tools are used, a serious problem has been that of determining stresses in finished products. It is common knowledge that even the most experienced operator cannot possibly main-



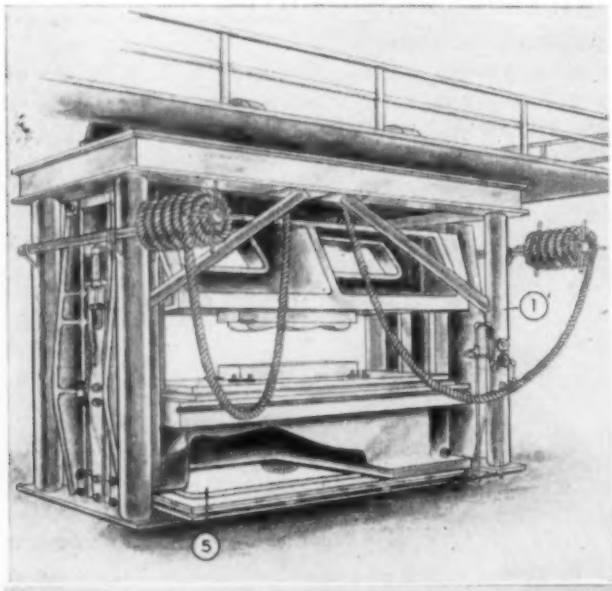
tain continuously an absolute uniformity in repetition of his manual operations."

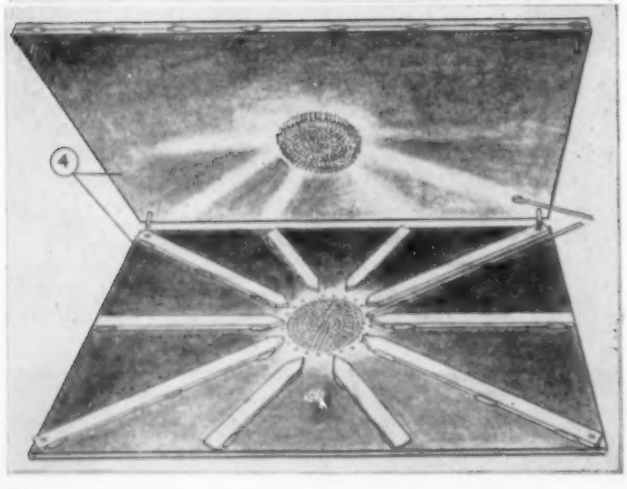
Development of a device which eliminates "guess" timing in operation of pneumatic machines may be considered an outstanding achievement, especially when uniformity in repetition is comprised in its basic performance, as it is in this application.

Notes on air flow of timing device: At line pressure, air enters through C at 1. Area adjacent to 1 fills up and air passes into 2, out of 3 into 5, to the appliance. Port 2 is of sufficient size to accommodate maximum air flow of timing device.

At D (spud) orifice, 3 is of such size to regulate desired speed of piston's travel. D will remain against 4 until 5 is closed by releasing trigger on appliance. The air pressure filtering through 6 equalizes pressure on both sides of E. Because area on downstream side of piston E is greater than upstream side, piston returns to normal position. Set screw F regulates timing by distance piston travels.

PNEUMATIC SHOCK ABSORBER

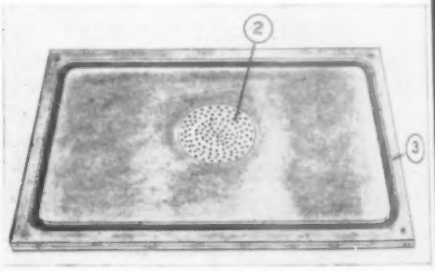




SHOCK ABSORBER PADS consisting of a sheet of impregnated duck, a rubber tube, and 222 3/8" escape ports mounted on a boiler plate, eliminate crystallization of hammer heads and prevent transmission of vibration to other parts of the factory.

The anvil rests on a pneumatic rubber tube, attached to the plate. When the hammer strikes, the anvil moves downward 1/4", absorbing the energy ordinarily resulting in shock as the air pressure first builds up, then is released through the ports, kept closed until now by a rubber diaphragm. Ten spacer bars support the pad.

1. *Drop hammer.*
2. *Exhaust valve.*
3. *Pneumatic pad.*
4. *Open view of pneumatic pad.*
5. *Pneumatic pad shown in cutaway, and in place on the hammer.*



MODULATED PRESSURE VALVE

ANY AIR PRESSURE desired when operating drills of various sizes is obtained by a modulating valve incorporated in a foot-controlled device.

Low pressure on the air motor avoids breaking small bits. Adjustment is obtained by turning a small screw on the side of the treadle, which is adjustable to any length shoe. The valve operates pneumatically and holds pressure, which the operator may check by glancing at the gage, both steady and accurate. Where possible, the meter might be raised to eye level for convenience of the operator using the valve.

Economical Blanking and Forming Dies

Eastern Aircraft Division of General Motors lowers production costs through attention in die design to major details of fabricating, set-up and operation

DIES for aircraft sheet metal should be cheap, but the cost of dies is relative to the number of completed parts required. For example, a form die to produce one thousand parts could be built for $100, or a die cost of ten cents per part. If subsequent hand operations add 20 cents per piece, the total forming cost amounts to 30 cents per piece. If a die costing $250, two and one half times the cost of the first die, forms the part completely and avoids hand finishing, forming cost is only 25 cents per piece.

The more expensive die is, therefore, the cheaper one. Consideration of this factor will determine, for example, whether the die to be made will be a drop hammer die or a draw die. But decisions concerning this factor must be made for each part individually. However, there are three factors well-worth consideration and common to die design for aircraft sheet metal:

1. *Fabrication*
2. *Set-up*
3. *Operation*

• **Fabrication** of a die involves consideration of the use of substitutes for strategic materials, provisions for changes and repair of the die, and the facilitating of machining.

For example, contoured nests for second form dies might be made of Masonite or plastic, with only the forming elements made of steel or Kirksite. For blanking dies, savings can be achieved by the use of composite die steels. These are made of a thin sheet of carbon or alloy tool steel riveted or welded to mild steel.

The Eastern Aircraft Division of General Motors has named this type The Standard Compound Type Die. For use on aluminum, these dies use a .30 carbon, manganese-silicon steel similar to plow steel. A ¼″ plate of this steel, normalized but not hardened, is riveted to a ¼″ C.R.S. filler plate. The die cavity or punch contour is machined and then riveted to a ½″ C.R.S. backing plate which is jig drilled to fit some one of a series of standard die shoes. Rubber, cemented to the backing plate, provides the stripping action. If the aluminum is under .064″ thick, the cutting steel is riveted directly to the backing plate.

For blanking chrome-moly steel up to .083″ thick, good results are obtained from this type die, substituting a N. E. steel X9130 for the manganese-silicon steel, and flame hardening the cutting edges. To provide sufficient rubber for stripping, ½″ thick filler plates are used.

For flame hardening the cutting edges of the die, a technique has been developed similar to that used in flame hardening gear teeth.

An oxy-acetylene torch tip is altered by the addition of a surrounding water jacket with a hose connection to a water line. This water jacket is perforated and thus provides a water quench surrounding the flame. Properly spacing the water jacket perforations in relation to the flame orifices governs the rapidity of the quench. On large dies, the flame hardening tip is set up on a pantograph and the hardening becomes semi-automatic, the tip following the path of the tracer roll.

Dies hardened by this method have no perceptible warp and do not need to be surface ground after hardening. Die openings are also held without distortion.

Designing to reduce machining time is an important factor in speeding up die making. Using cold-rolled steel for straight sections and flat elements in forming dies saves time, lowering production costs.

DIE SAVES TEDIOUS DRILLING JOB

● Until a special die was developed, one of the rubber companies producing self-sealing gas tanks found it necessary to drill several holes around a steel hand-hole insert fitting. The fitting is bonded to the rubber around the hand-hole, permitting assembly of a gasket to the tank.

Individual piercing dies are secured to a retainer set with screws and dowels. They are laid out on a surface plate, and held to an accuracy of approximately plus or minus .002″. The set-up is adjustable.

This is an example of devising mass production equipment to eliminate a tedious jobbing shop practice. It is typical of the contributions which automotive manufacturing engineers — particularly the tool and die shops serving the industry — have made.

Davis Tool & Engineering photo

Hydraulic Press Manufacturing photo

STREAMLINING DEEP DRAW METHODS

The forming of sheet metals has been the big job of the metal aircraft builders and their many sub-contractors.

In less than one minute, the airplane upper tank section shown above is drawn from a flat blank to the required shape on a hydraulic deep sheet metal drawing press.

Previous to the installation of the hydraulic press, such parts were formed with drop hammers at the rate of one every two hours. Many times it was necessary to fabricate the sections from numerous smaller formed parts.

Now the tank section is produced by the press in a single stroke. The press is a self-contained type, equipped with hydraulic blank-holder and die cushion. A matched punch and die set is used. A ring carried by the blank-holder slide holds the blank while the part is drawn.

Cold-drawn drill rod can be used for locating pins and perforators. Use of welded construction instead of a casting, saves pattern making time. On the other hand, a Kirksite casting for a double curvature form die is a tremendous time saver over die-sinking and fitting a steel die. The use of commercial die sets saves many hours of making and installing leader pins and bushings.

Anticipating engineering revisions, and designing dies to permit changes requires more than patience and ingenuity. It often requires a crystal ball. But some steps can be taken. For example, make blanking dies sectional; in piercing dies, use die button inserts in machine steel blocks; hold irregular shaped punches with cerromatrix; standardize the shank diameters of piercing punches; in progressive dies use separate punch holders and die steel for each stage.

All these methods also provide for easy and rapid repair and replacement of worn or damaged die elements.

Streamlined Production

SET-UP

SET-UP MEN today are often relatively inexperienced and always in a hurry. It is important, therefore, to give special consideration to the mounting of the die in the press selected, and to avoid operating difficulties. We have learned, the hard way, that the only way to assure accuracy in the setting of cutting and forming dies is to provide these dies with leader pins. And the only way to make certain that alignment between punch and die will be maintained, in spite of worn or loose ram gibs, is to provide guide bushings the length of which will be sufficient to engage the leader pins before the upper die touches the work.

•

Commercial die sets, available from a number of sources in an almost infinite variety of sizes, meet these requirements. When making cast form dies, however, it is often more economical to cast bosses on the upper and lower dies, and to specify the installation of standard leader pins and guide bushings.

Another setting up hazard is improper ram adjustment. With the shut height of the die, die steels are often crushed or cracked.

To reduce this danger, design to provide bumper or stop blocks. These are hardened blocks which are mounted on the lower die shoe and ground to allow .015″ to .030″ less than shut height. These blocks are not to be confused with set blocks or gauge blocks, sometimes used for die setting and naturally they should never be set under the guide bushings.

As a further precaution, the press and bolster plate selected, as well as the thickness and material to be worked, should be stamped on the die.

FEEDING STOCK

FEEDING of the stock into the die and removing the finished part must be made easy and foolproof. Remember that almost all woman press operators are inexperienced and are started on press work with very little instruction. About all they know, to start with, is how to trip the press. They are told to keep their hands from under the ram; but dies should be so designed that there is no necessity for operators' hands being near the upper die. Inclining the press and letting the finished parts fall or be blown off the die is preferable to removing the parts by hand tongs and picks, but provision should be made for use of hand tongs and picks in the design of the die.

•

Stock stops, whether automatic or fixed, should be plainly visible to the operator. When the stock layout calls for a double pass, make the stock stop foolproof so that the operator is not required to look for the proper opening in the scrap.

An important, but often neglected, detail is the proper height of the stripper above the die steel. If this is too small, the distortion of the scrap will bind the stock in the die and make it difficult or impossible to continue feeding the stock. A good working figure for height of stripper above the die steel is 2½ times stock thickness, but this figure may vary up or down depending on the characteristics of the scrap skeleton.

Practical Ideas Increase Machine Output

Northrop Aircraft, Inc., applies workers' suggestions to problems of forming and machining. Less down time and higher production quality are results

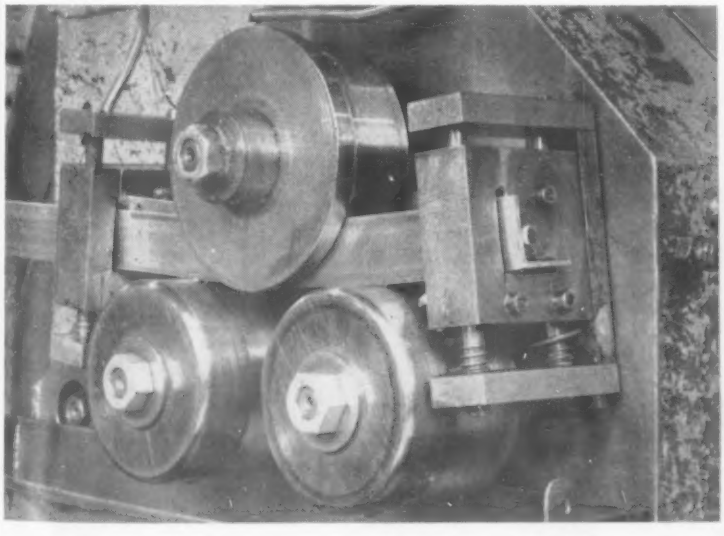
DIE-SHAPED GUIDES

Lyle Swanson demonstrates his die guides for power rolling extrusions. Straight stock enters machine, is rolled back and forth until proper curve is attained.

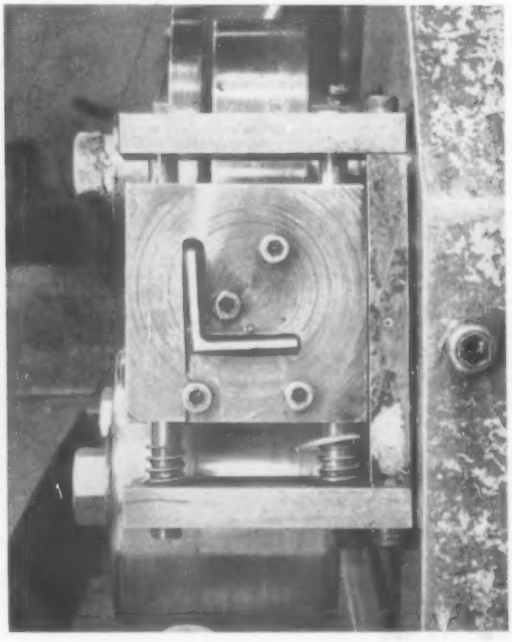
Northrop photos

DIE-SHAPED GUIDES, riding free vertically, but held to a close tolerance horizontally, enable sheet metal workers to power-roll right-angle extrusions into desired curves without opening up and developing ridges as metal is crowded into the inside leg.

The device, developed by Lyle Swanson at Northrop Aircraft, Inc., eliminates hand filing, sanding and reforming previously connected with roll-forming. Straight stock is rolled back and forth until the proper curve is obtained as specified for the part.

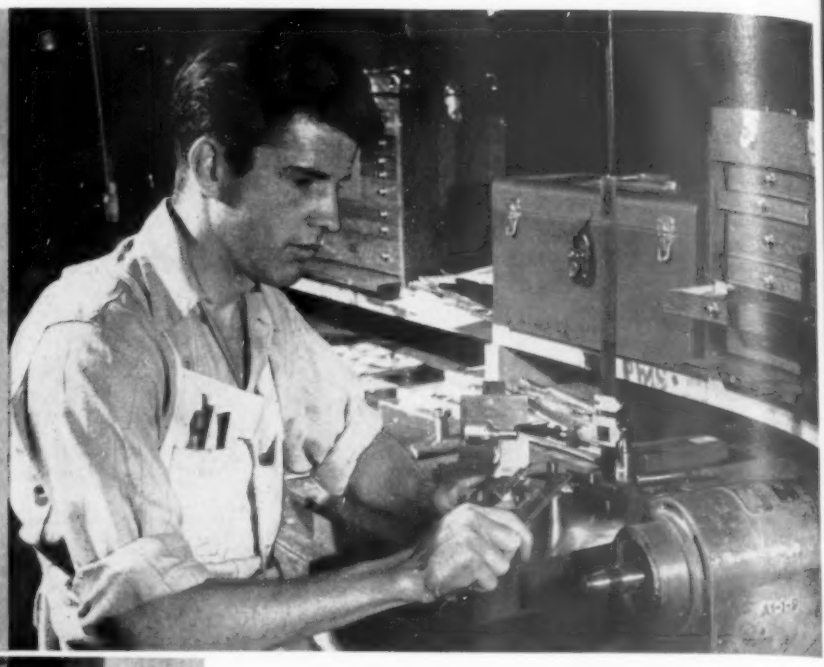


Above: **Die guides use same attaching holes as the old type rollers.**

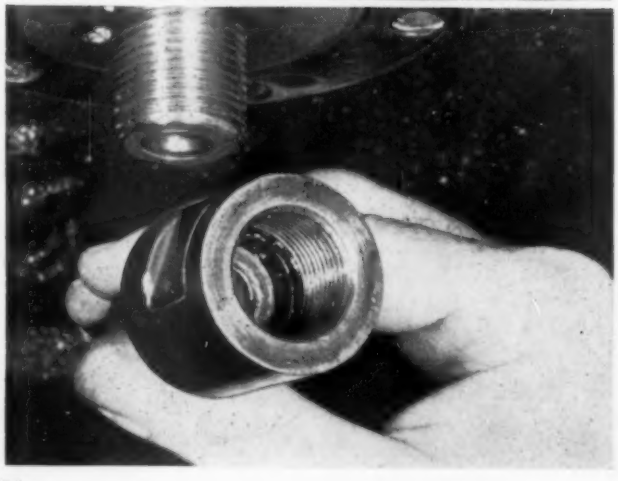


Right: **Without guides, excess metal crowded in vertical leg of extrusion, causing angle to spread. Die guide corrects this, removes burrs.**

IMPROVED ROUTER SHAFT AND CHUCK



Right: W. K. Pendleton, Northrop machinist, who received Honorable Mention for production ideas from the War Production Drive Headquarters in Washington, for improvements in router shafts and chucks.



TURNING at 15,000 rpm., conventional router chucks used in Northrop Aircraft's router room gave up the ghost after an average of 16 hours in service.

A couple of thousandths off center at this speed vibrates the chuck to the breaking point. The photos show how and where the chucks broke, and how they were attached to the router shaft by the conventional method.

The improved router shaft and chuck, designed by Northrop machinist W. K. Pendleton, is applicable to all types of routers, serving for 400 hours or more.

Left, above: Close-up shows new type chuck and shaft. Taper given shaft and chuck draws the chuck to exact center and eliminates vibration.

Left, below: Close-up of old type chuck. Turning at 15,000 rpm, any eccentricity causes vibration, hammering and short-lived chucks.

Below: Line-up compares old and new chucks. Old chucks became crystallized after approximately 16 hours service. New type give better than 400.

Ingenious Tooling Is Broadly Applicable

Southern Aircraft Corporation finds production economy in the development of inexpensive but well designed jigs and dies. Several examples are shown here

BLANKING NEOPRENE

BLANKING AND PIERCING 1/16" Neoprene presents the troublesome problem of making a clean cut when cutting against a wood or fiber block.

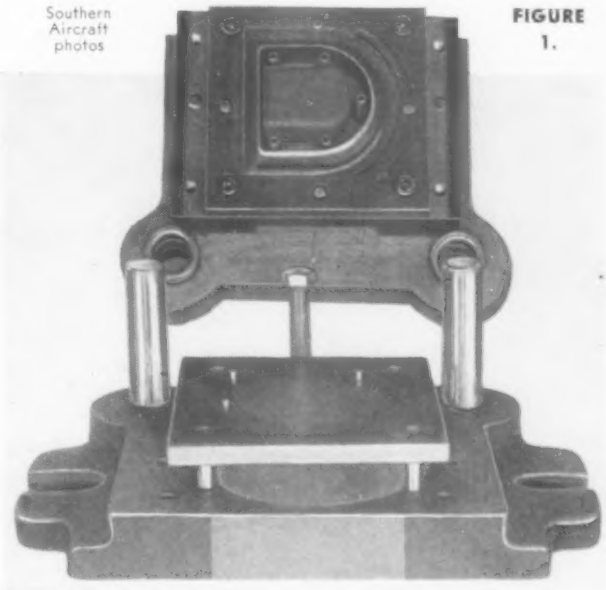
Because of the toughness of the material, and because of the fixed length stroke of the punch, the blocks cut out too soon, and a new setting of the ram, or a replacement of the fiber block is required.

To provide a block which would not be injurious to the cutting edges of the punch, and yet stand up through long production runs, a Kirksite plate was substituted for the fiber block. To compensate for any wear, and to give resilience to the plate, it was mounted on stripper bolts, with a 1" pad of rubber between it and the lower part of the die set, as shown in Figure 1.

The ram is set to compress the rubber pad under the Kirksite plate so that enough pressure is built up to cut a clean part.

Southern Aircraft photos

FIGURE 1.



DRILL JIG

SEVERAL METHODS could have been applied to the problem of drilling the part shown in the foreground of illustration 2-a. The part specifications called for five holes to be drilled in one plane and two to be drilled in another. Because of chips, and the weight of the jig, the use of an angle plate with the jig was considered undesirable. As a result, a tilting hinged lid was designed to provide for clamping the part directly to it.

Figure 2-a shows the drilled plate in a horizontal plane for drilling five holes. Figure 2-b shows the lid locked at an angle for drilling the two remaining holes.

FIGURE 2-a

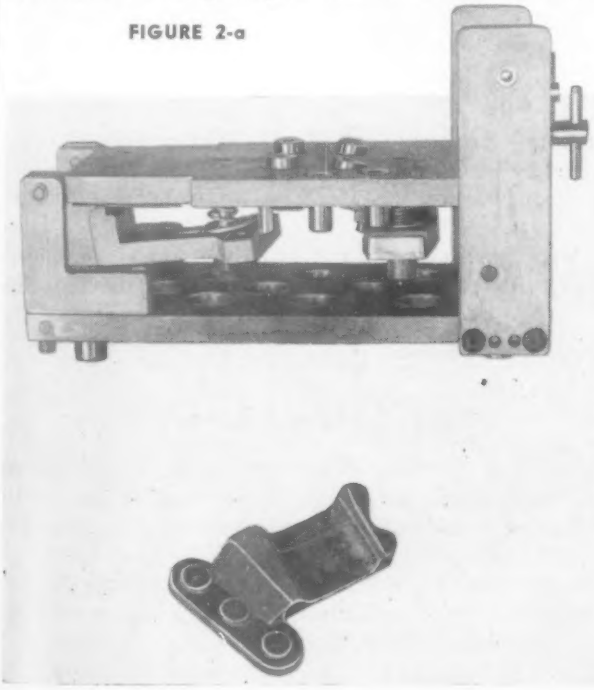
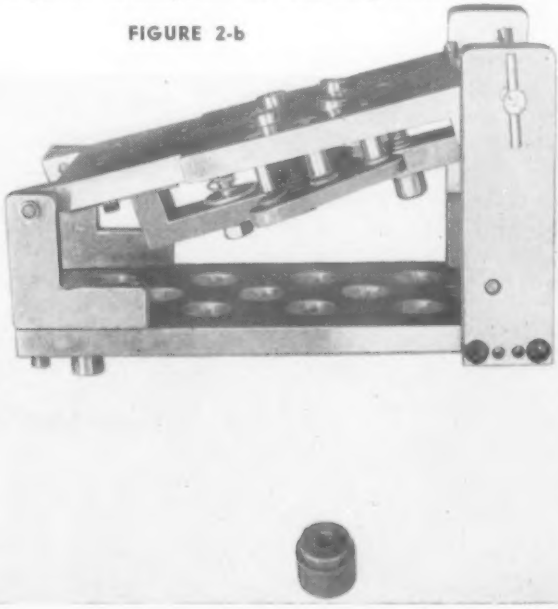
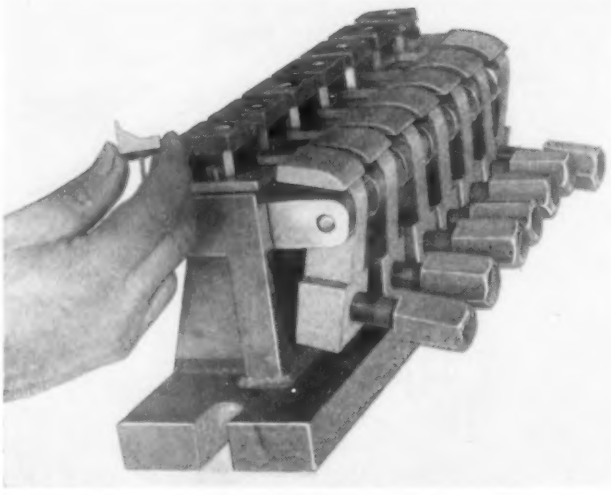
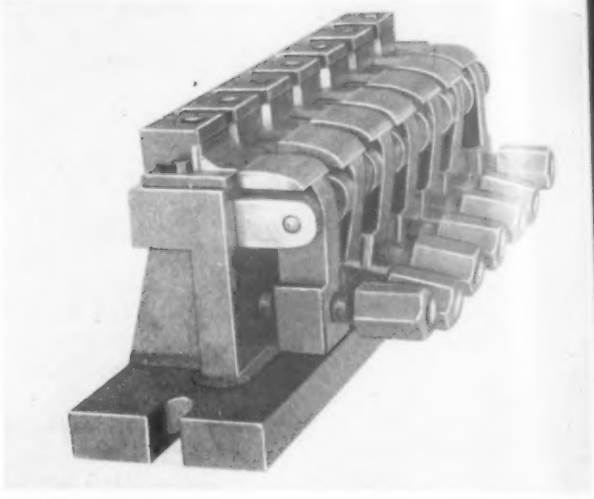


FIGURE 2-b





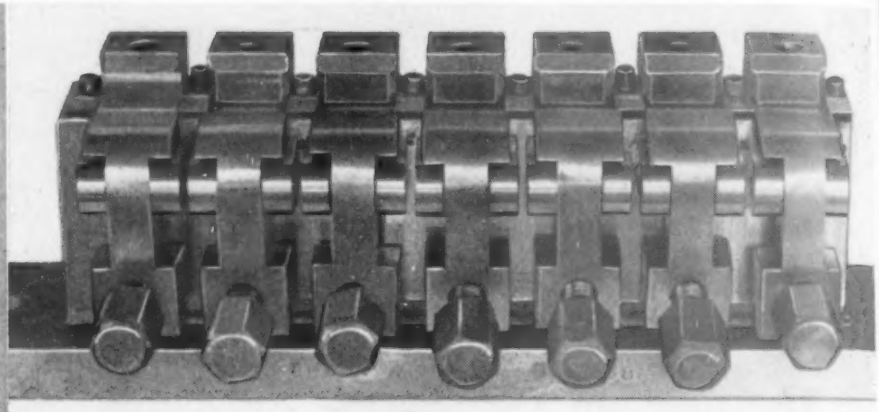


Above, left:
FIGURE 3-a

Above, right:
FIGURE 3-b

Right:
FIGURE 3-c

MILLING

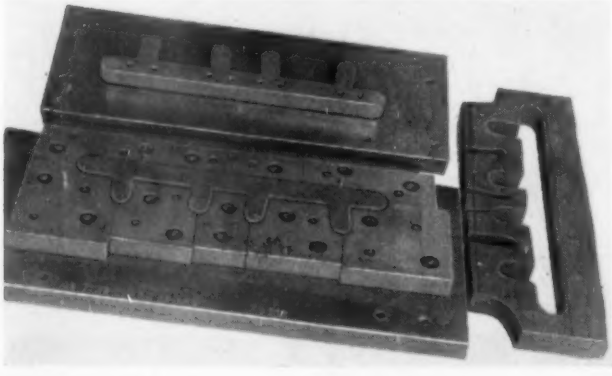


THE PART SHOWN in the operator's hand, in Figure 3-a, is milled from a rectangular block of steel, and must be produced in quantity.

The upper lip on the part is 1/32" thick. Because a heavy cut must be taken to remove excess stock, the part must be held with a powerful clamping pressure.

Figure 3-b shows a part clamped in position after milling. Approximately a two to one clamping pressure is provided by the lever system. Figure 3-c shows the seven stations and the spacer blocks for taking the lateral thrust of the cutter.

Rigid welded construction is shown in the various views. To eliminate wear on the clamping surfaces, these were all made of tool steel and hardened.

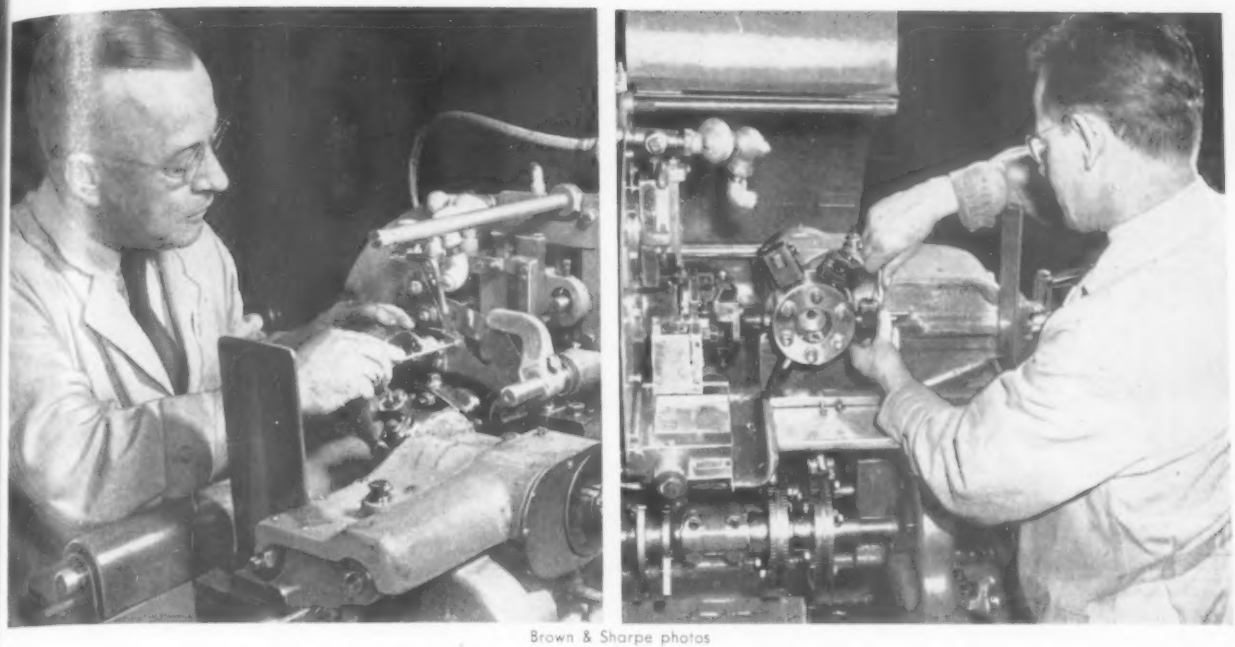


SECTIONAL DIE

FIGURE 4 ILLUSTRATES a rather intricate sectional die which makes use of 1" cork for ejecting the blank, and a ring of rubber, shown at the extreme right, for stripping the scrap from the punch.

Worth special attention is the way in which the die was designed. All breaks that are made on a radius are cut perpendicular to the tangent point. This eliminates any acute angles on the sections at the cutting edges, which, of course, increases strength. To eliminate warpage, the punch itself was made in two sections.

When sections were all secured in place, previous to finishing the die, all radii were bored in the jig borer, thus eliminating tedious hand work. THE END



Brown & Sharpe photos

Simplicity of setting up modern machines permits economical production of many parts in relatively small quantities.

Screw Machine Progress

L. D. SPENCE
BROWN & SHARPE
MANUFACTURING COMPANY

MODERN manufacturing conditions require a wide range of spindle speeds in today's automatic screw machines as well as in other machine tools.

Grinding machines must provide adequate spindle speeds to enable the grinding wheel to produce the desired quality of finish and accuracy. For example, if a grinding wheel of medium size requires a peripheral speed of 7000 feet per minute for best results, the spindle and gearing must be designed to permit this surface speed. However, if the same grade of grinding wheel is required for operations that would need a smaller diameter wheel, higher spindle speeds are required to obtain the required peripheral speeds.

Milling operations also vary greatly in spindle speed requirements. A wide range of spindle speeds is provided in milling machines, because of the different grades of material being machined. When machined at high speed with correctly selected cutters, some of the free cutting materials show less distortion than if lower speeds are used, because less heat is carried to the work at high cutting speeds. Many milling operations are performed at relatively low speeds, however, because of the nature of the material being machined.

Profiling and engraving are interesting examples of the use of high spindle speeds for milling operations. Often the required spindle speed is too great for the use of a regular production milling machine. Therefore, machines especially designed for this class of work, or the application of attachments to a regular machine, are necessary.

Drilling operations also require a wide variety of spindle speeds to obtain the correct surface speed for the different diameters of drills to be used. Drilling of deep, small diameter holes requires a spindle speed suitable to the cutting quality of the material being machined. Certain drilling jobs require high spindle speeds to provide a straight, concentric hole true with the axis of the piece, especially when the material is free cutting.

The different classes of machining operations mentioned, particularly those which require high spindle speeds, call for spindles of relatively light construction, rotating in one direction only. These illustrate the importance of equipment that will provide correct spindle speeds for all operations.

Automatic screw machines, such as those manufactured by Brown & Sharpe, perform a wide variety of machining operations on all classes of material produced in rod form of all dimensions. A spindle speed arrangement providing a wide range of

More varied arrangements of spindle speeds and increased rpm. have met machining requirements of modern materials. Supplementary advantages are accessories and improved attachments which reduce idle time. Automatic screw machine advancement is traced through developments of the Brown & Sharpe Company

SPINDLE SPEEDS

SPINDLE CHANGE GEARS L.H. Lower	SPINDLE CHANGE GEARS L.H. Upper	High Speed	RATIO CHANGE GEARS Upper / Lower	LOW SPEED	OPPOSITE DIRECTION FRONT				SAME DIRECTION REAR			
28	67		31	35	39	42	46	49	53	56	60	64	67
64	28		64	60	56	53	49	46	42	39	35	31	28
*67	28	3000		† 1630	† 1355	† 1135	† 1000	† 840	† 740	625	550	460	385	
*64	31	2600	† 1630		† 1170	980	860	725	640	540	475	395		285
60	35	2150	1355	1170		810	715	600	530	450	395		275	235
56	39	1800	1135	980	815		600	505	445	375		275	230	200
53	42	1580	1000	860	715	600		445	390		290	245	200	175
49	46	1340	840	725	600	505	445			290	245	205	170	147
46	49	1180	740	640	530	445	390			245	215	180	150	130
42	53	1000	625	540	450	375		280	245		180	155	130	110
39	56	875	550	475	395		290	245	215	180		135	110	96
35	60	735	460	400		275	245	205	180	155	135		93	80
31	64	610	385		275	230	200	170	150	127	110	93		67
28	67	525		285	235	200	175	145	130	110	96	80	67	
Ratio of High to Low Speed			1.6	1.8	2.2	2.6	3	3.6	4.1	5	5.5	6.5	7.9	9.1

Spindle Running Fast Backward — Open Driving Shaft Belt.
Spindle Running Fast Forward — Cross Driving Shaft Belt.

† These combinations not to be used in opposite directions.

* These Speed Groups not to be used on machines equipped with 1¼" capacity spindle.

FIGURE 1.

Automatic production of parts required for many products not now being manufactured will prove to be valuable.

speeds is necessary if maximum production combined with accuracy and good finish is to be obtained.

The spindle of such machines must provide two speeds with each set of spindle speed change gears, with one speed available in reverse for internal or external threading operations. For certain work, both speeds must also be available for rotation in the same direction.

When work of this nature requires external threads, a self-opening die head can be used. The lower speed provides a suitable surface speed for the threading operation. The instantaneous reversal of the spindle of a Brown & Sharpe automatic screw machine controls somewhat the maximum speed of the spindle; however, this reversal is necessary because of such operations as internal and external threading which require the use of solid dies.

All threading operations, regardless of the type of die used, require a spindle speed much lower than that essential for such operations as turning, forming, and cutting off. Combined with this factor is the variation in machinability of different materials from which parts are produced and the wide variation in dimensions of the bar.

The earliest designs of Brown & Sharpe automatic screw machines provide 12 to 16 spindle speeds and from these must first be selected a suitably low speed for threading, if required. The low speeds provided in these machines are in ratios of approximately 1:2.6 to 1:3.5 with the corresponding ratio in the high speed range.

For many years, cutting qualities of materials used did not vary widely, and 12 to 16 spindle speeds in the ratios mentioned were considered satisfactory. But development of high speed cutting tools, alloy steels for automobile and airplane manufacture, stainless steels, cold drawn steels with increased sulphur content, freer cutting brass and aluminum, and fibrous and plastic materials has called for an entirely different spindle speed arrangement.

RANGE OF SPEEDS

Frequently, aircraft parts produced from alloy steels of high tensile strength require a surface speed as low as 8 sfpm. to perform a threading operation satisfactorily. Other operations can be performed on the same material at 50 to 65 sfpm. For such work, the automatic screw machine should provide a ratio between the low and high spindle speeds of approximately 8:1. To maintain these surface speeds for both classes of operations and to keep all diameters of bars machineable within the capacity of each machine, a range of spindle speeds in both the high speed and low speed groups is necessary.

Tool steel readily machines at approximately 75 to 80 sfpm. whereas cold drawn steels of low carbon and low sulphur content require a speed of approximately 140 sfpm. Cold drawn steels of low carbon content having a high sulphur content will successfully machine at 250 to 300 sfpm. This latter grade of steel is one of the most free cutting steels used in production of parts on the automatic screw machine.

In addition to allowing for the varied machinability of different steels, provision must be made for suitable spindle speeds for production of parts from freer cutting materials, such as brass, aluminum, fibre, and plastic materials. If parts are to be produced efficiently, spindle speeds much higher than those for other materials are necessary. With high speed cutting tools, correctly hardened and ground, speeds of 600 to 700 sfpm. are often desirable.

Maximum spindle speeds available in four Brown & Sharpe automatic screw machine models are 6000 rpm., 4150 rpm., 3000 rpm., and 2150 rpm.

To maintain the surface speed necessary for accuracy and quality of finish, high speeds are required not only for the free cutting materials mentioned, but also for small diameter bars of material that is not free cutting.

The No. 2-G Automatic screw machine (3000 rpm. maximum) has an oversize feed tube for bars of 1-¼" diameter. This capacity meets varied manufacturing requirements of a

broad range of materials. It provides almost any desired speed for threading and other operations requiring slower spindle speeds and furnishes a high speed for performing further operations necessary to complete the piece.

Low speeds in ratios of 1:16 to 1:9 are available, and a ratio of 1:10 can be provided by adding a special set of change gears. Meeting requirements of a wide range of cutting qualities combined with the variation in diameter of bars, this machine furnishes approximately 120 spindle speeds.

Figure 1 shows the spindle speed arrangement of the No. 2-G automatic screw machine.

ADDITIONAL SPINDLE SPEEDS

The No. OO-G and No. O-G automatic screw machines are arranged with two groups of low speeds for threading operations. These speeds are in ratios of 1:3 to 1:5 with the corresponding speed in the high speed range. If desired, an attachment can be applied to provide 12 additional speeds in ratios of 1:10 with the high speed range, thus making a total of 48 spindle speeds. The 1:10 group is widely used among manufacturers engaged in production of parts from alloy steels of high tensile strength.

The spindle speed range in modern Brown & Sharpe automatic screw machines permits the draftsman designing a set of cams for production of a part from any material, to select speeds which will provide the surface speed at which the material machines satisfactorily. With older design machines, it is necessary to select the speed for the threading operation and to accept the corresponding speed available in the high speed range, although it may be much too low to meet the material's requirement.

Maximum spindle speeds of current model Brown & Sharpe automatic screw machines are two-and-one-half times greater than those used in machines of the earliest design.

Engineering changes in the spindle bearings and in the reverse and feeding mechanism have permitted spindles to operate successfully at higher speeds.

High speeds are necessary in the manufacture of products requiring a high degree of accuracy and finish. Many small parts of this nature must be produced at exceedingly fine feeds, often as low as .0002" per revolution of the bar. If the material is free cutting, or the diameter of the bar is sufficiently small, it may be necessary to use the maximum speed available.

Spindles will successfully operate at their maximum speed over long periods. They should, however, receive attention from time to time so that they remain in correct adjustment. The front bearing should be adjusted to a minimum amount of lift, or approximately .0002". When the bearing is adjusted in this manner, work can be produced with a higher degree of finish and accuracy than if a greater amount of freedom is allowed. Roller type bearing design is the result of long tests in actual production of parts produced from material requiring the maximum speed available.

So that full production advantage might be realized from the faster cutting operation resulting from higher spindle speeds, study has been devoted to the time required to feed stock, index the turret, and bring tools into position, all of which is considered idle time.

While the feeding length for one operation of the feeding mechanism of current model machines is shorter than was previously possible, it is sufficiently long to meet the requirements of a large percentage of the work. Feeding of stock can be performed in half the time formerly required.

Movement of the turret slide for the withdrawal of tools has also been shortened, but it is within the turning length required by most operations. This change permits the indexing and withdrawal of turret tools in half the time required by older model machines. If greater feeding length and turning capacity are desired, attachments are available to provide them, but time necessary for these operations is increased.

Time required for both fast and slow feeding of stock, withdrawing of tools, and indexing of the turret on Brown & Sharpe machines is:

Machine	Fast	Slow
No. 00-G	¼ second	½ second
No. 0-G	⅛ second	½ second
No. 2-G	½ second	1 second

The speed at which these operations are performed is regulated by the speed of the driving shaft and by the use of a long or short turret change shaft which determines the distance tools can be withdrawn from the work prior to indexing the turret.

Such other features as "double indexing"—that is, indexing two holes of the turret in the same time as re-

Using the highest spindle speeds available on present day machines, production two-and-one-half times that of earlier design machines is frequently possible.

quired for indexing one hole only—have also speeded production. This feature is used on work requiring only three turret positions, such as centering, drilling, and tapping. The swing stop used in improved design machines also reduces idle time, because it operates in conjunction with the feed of the bar, and no additional time is required as is necessary when using a stock stop in the turret.

Reduction in idle time, supplementing an arrangement of low speeds in combination with the high speed range, permits a substantial increase in output. Using the highest spindle speeds available, production two-and-one-half times that of old design machines frequently is possible.

These machines can prove valuable in a post-war endeavor to provide automatic manufacture of parts required for various products not now being produced.

Because of the great need for automatic screw machines to furnish sufficient parts to meet war production requirements, all types of machines have been placed in operation. But old machines will not be efficient enough to meet the post-war manufacturing competition.

The simplicity of setting up modern machines for output of parts required in relatively small quantities will permit economical production of a wide assortment of components within the capacity of each machine.

Many improvements in attachments for modern machines, plus provision for longitudinal turning, vertical slide, and thread chasing attachments, are not available for use with machines of older design.

From time to time special attachments are furnished to meet the particular requirements of parts produced in large quantities. These include magazines for second operation work, milling attachments for the turret or cross slide, and drilling and hobbing attachments.

THE END

Broaching Speeds Output of Brake Shoe Parts

● APPLICABILITY of broaching to remove large amounts of stock rapidly and with extreme accuracy is shown in its use by the Aeronautical Division of National Acme Company to cut deep slots in alloy steel drive spline inserts for hydraulic disc brakes. More than half the original diameter of 13/16″ round stock is removed over a length of more than 3″ in two passes by a single machine equipped with two broaches.

Width of the slot, and depth from end to end, are held within close limits. The slot is located directly opposite a narrow slot on the periphery of the piece. The set-up utilizes a horizontal broaching machine of sufficient capacity to pull the two broaches simultaneously, and a special fixture designed by the Colonial Broach Co., for rigidly holding two pieces in the correct location.

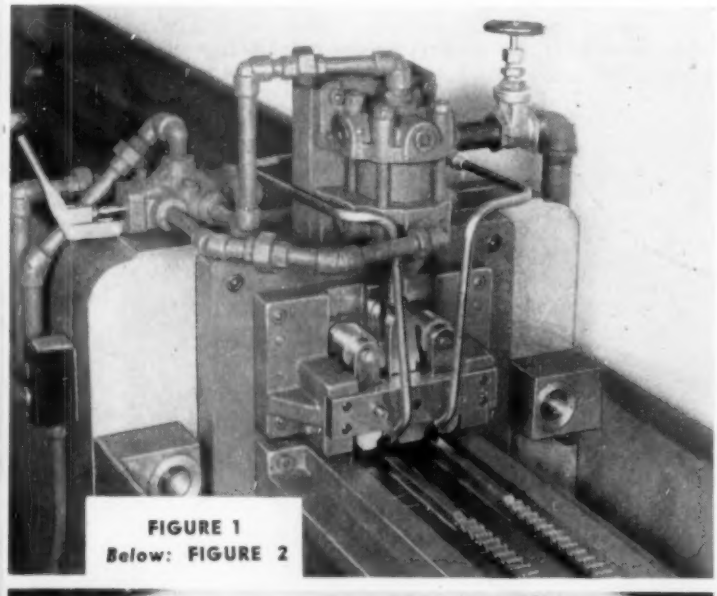
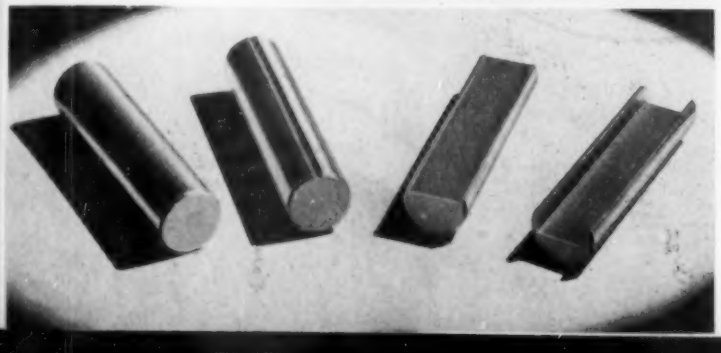


FIGURE 1



Below: FIGURE 2

The fixture is mounted against the face-plate of the horizontal machine and is hydraulically operated. The broaches are of the sectional type mounted in broach holders which move in individual guide ways bolted to the vertical base plate of the fixture.

The fixture is of the cam-and-roller type and clamps two pieces simultaneously (Figure 1). The center portion of the clamp is rigidly attached to the bar shown across the face of the fixture. This serves to form half the semi-cylindrical contours in which the pieces are held in both stations, and to locate them. The broached slot in each part must be exactly opposite a narrow slot with a bottom radius, which has been previously broached in the part in another machine. The center portion of the clamp, therefore, is fitted with fingers or lips. These fit into the narrow slots and position them above the broaches.

Outside the center portion of the clamp are two movable arms which move against the parts and hold them tightly in place when the piston of the hydraulic cylinder moves upward. The lower ends of these arms form the remaining halves of the semi-cylindrical contours into which the parts are placed while being broached. The parts fit freely into the contours when the clamps are released, but are rigidly held when in the holding position.

For convenience in loading, the pilot ends of the broaches are grooved. The pieces are placed by the operator on the broaches so that when the broaches move inward, the parts are drawn into the fixture. Clamps are closed and the broaching passes completed. Broach return pushes the parts out of the clamps. The operator moves one part into the second station, inserting an unfinished part in the first station.

In the first station, the broach produces a flat the length of the piece, removing approximately ¼″ off the diameter, at the same time leaving about 1/32″ to start forming the sides. In the second pass, the slot is deepened approximately ¼″. Width is not only brought to size, but the sides of the slot are highly finished and held within close limits. Top edges are also rounded.

Figure 2 shows the parts in various production stages. Production rate is about 100 pieces per hour.

ACCESSORIES

It is customary to think of accessories as attachments and appliances which will increase machining range or productivity. Actually, the very machines, from midget to giant, the welders, conveyers, and spray booths, are accessories to the plant. The complete plant, then, is the tool of production

A. E. RYLANDER
TECHNICAL EDITOR

ELECTRIC MOTOR

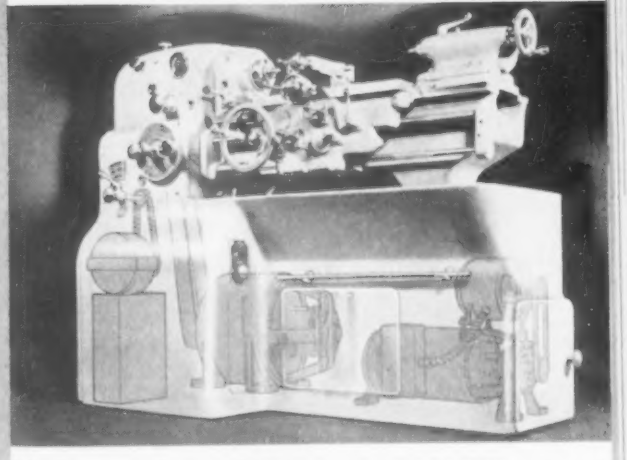
FEW PEOPLE regard the electric motor as a machine accessory. Yet, it has revolutionized industry through the individual drive for machine tools. Without it, "streamlined production" with its modern machines and tools would still be a vision.

Electric motors permitted a disposition of machinery impossible with line shaft drives, added to cleanliness and visibility, and eliminated the squeal and noise which were accepted evils.

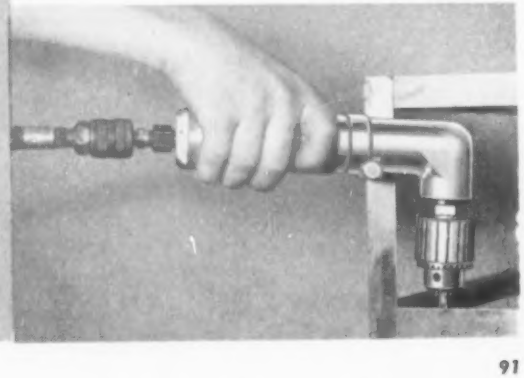
The electric motor did not eliminate the belt, but it shortened centers and increased power through the use of V-belt drives. It made all but the biggest machine tools portable, to be located to the best advantage for sequence operations.

The electric motor has had many offspring, each an invaluable accessory in itself. Included are electric drills, saws, and grinders, without which industry would be stymied.

Above:
Precision grinders applied to complicated job on hydraulic valve parts. Seven plants refused job before this economical operation was devised. Dumore photo.

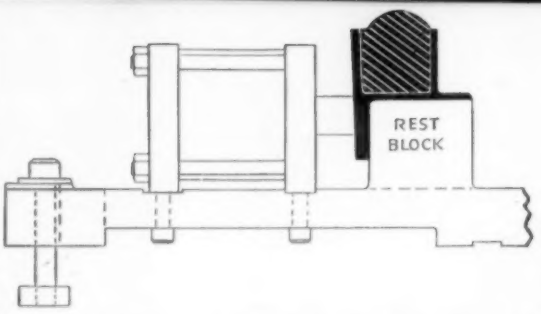


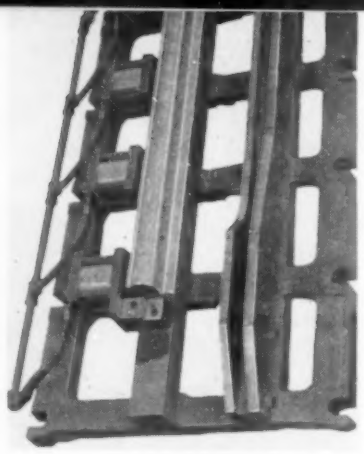
Right:
Adjustable speed drive applied to a precision toolroom lathe provided spindle speeds from five to 2500 rpm, with but one gear change. Reliance Electric photo.



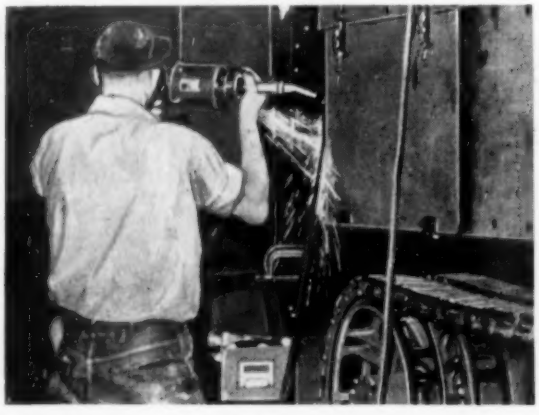
Right:
Pneumatic right angle drill used in a tight spot. Size, compactness and portability permit its application here. Aro Equipment photo.

Left:
A burring operation on a fan housing is facilitated by portable electric drill. Limited production was a factor. Skilsaw photo.



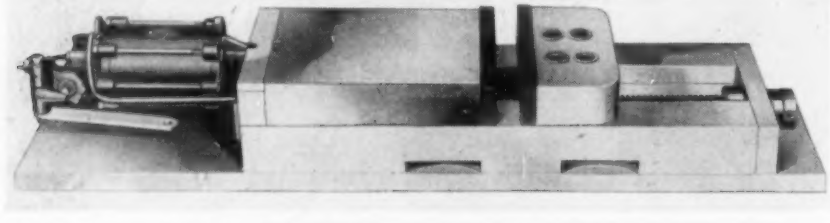


Above and right: Photo shows section of a fixture which is mounted on 45-foot milling machine bed for milling long forged or extruded aircraft parts. Cross-section shows work and one of series of clamps controlled by pneumatic cylinders. Onsrud photo.

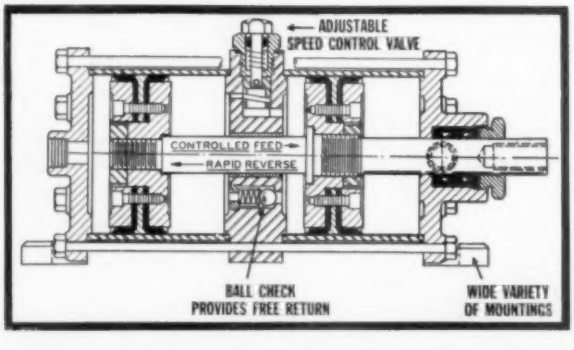


Bringing tools to the work has been a contribution of both electric and pneumatic portable tool makers. In starting the war production job and in maintaining the pace, they have proved invaluable. Rotor Tool photo.

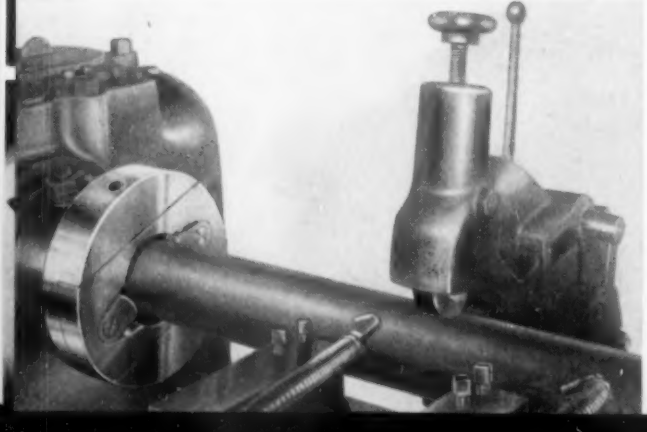
Hand valve of revolving disc type can be applied in any position. It is self-sealing and requires no replacement of parts. Anker-Holth photo.



Above: Automatic milling machine vise keys to reciprocal action. Clamping effort ranges from one to 40,000 pounds. Bellows photo.



Below: Work-driver on semi-automatic lathe. Self-centering, quick acting, it is designed to eliminate dogging. Seneca Falls photo.



Above: Using air as a power means and oil as a regulating means, cylinder provides smooth feed stroke, continuous or adjustable. Logan photo.

Right: Running down ¼" nuts with 45° angle wrench (impact type), especially designed to speed the job in hard-to-get-at places. Chicago Pneumatic photo.

PNEUMATIC APPLIANCES

NEXT as an industrial revolutionary, comes compressed air, recently augmented by its more powerful ally, the high pressure hydraulic system. For the pneumatic tool, the flexible hose is analogous to line shaft and electric conduit.

While compressed air lent itself admirably to riveters, hammers, structural tools, and drills, it proved too "jumpy" for many uses where speed control was essential. Lately, however, controls have been greatly improved, and air-hydraulic cylinders—i. e., air motivated but oil cushioned—are widely used.

Air operated "motors"—actually, cylinders—have been developed as accessories to standard machine tools. Applied to a drill press, for example, they clamp and discharge the workpiece and operate the spindle in a complete automatic cycle. They are also applied to convert hand milling machines to power feed. Combined with air-operated vises and clamps, they practically convert conventional, hand operated machines to semi-automatic.

The air chuck has long been an accessory to the turret lathe, to which has been added the pneumatic feed for bar stock. Thus equipped, the plain turret lathe is a close runner-up to the screw machine with its spring collets and automatic bar feed. The air chuck lends itself to odd shapes, since the jaws can be shaped to hold almost any work piece within the range of the chuck and swing of the machine.

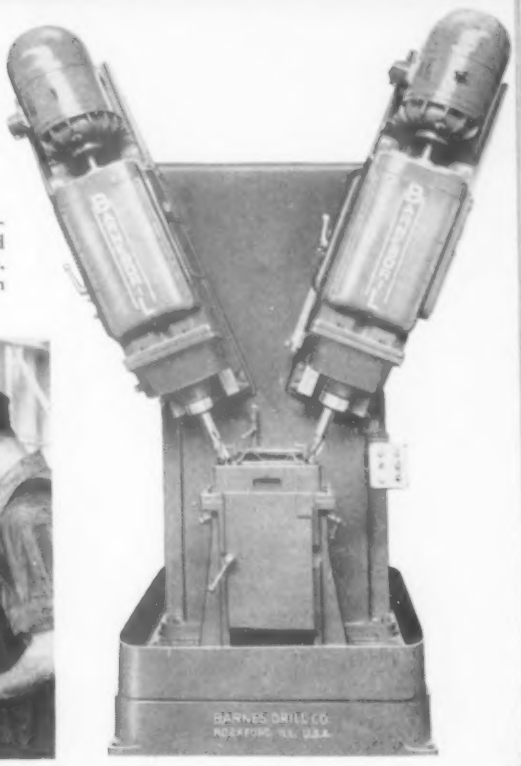
While in no sense a competitor to the air chuck, a work driver of comparatively recent vintage greatly speeds the "dogging" of bar stock. Simply center the stock and start cutting; the harder the pull, the tighter the grip.

HYDRAULIC ACCESSORIES

REMARKABLE as are the strides in hydraulic application, this development has a future far in excess of modern application. Hydraulic feed, for instance, offers a range from zero to beyond the capacity of the machine, and a nicety of control impossible to attain with conventional mechanical feeds.

Frequently, a question arises concerning the use of hydraulic motors as machine tool drives. There is no question as to whether they work, but they frequently appear superfluous because they must operate from an electric motor-driven pump. Since the motor is there anyway, it may as well operate the spindle. However, where a flexible drive unit is advantageous, hydraulic motors can be used with considerable success, since power may be held at maximum efficiency, regardless of speed. The advent of variable speed electric motor control, offering this same advantage, is an interesting development, awaiting postwar application to determine acceptance.

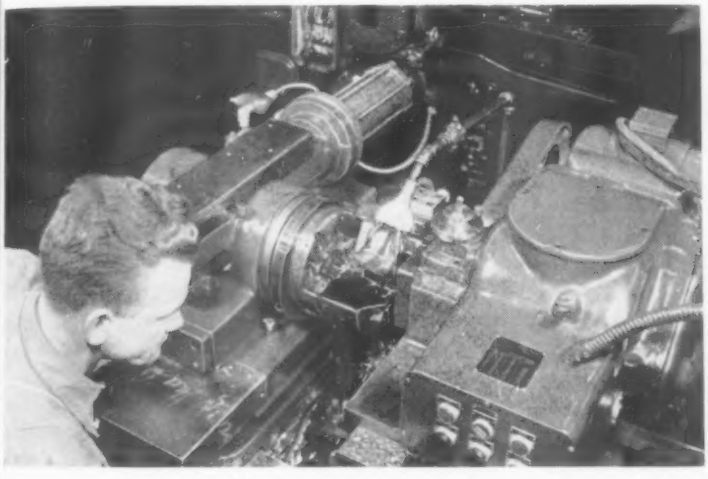
Right: 2-spindle drilling machine equipped with two automatic operating hydraulic drilling units, each arranged with 12″ spindle travel. Barnes Drill photo.

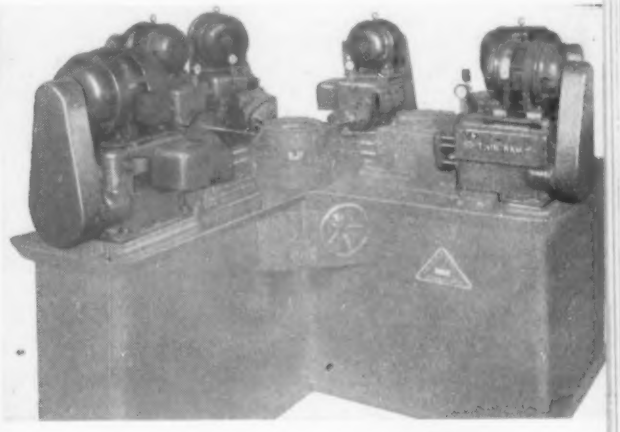


Below: Precision mass production resulting from broaching has been facilitated greatly by application of hydraulic force. Accurate, sure location of work has been important. Oilgear photo.

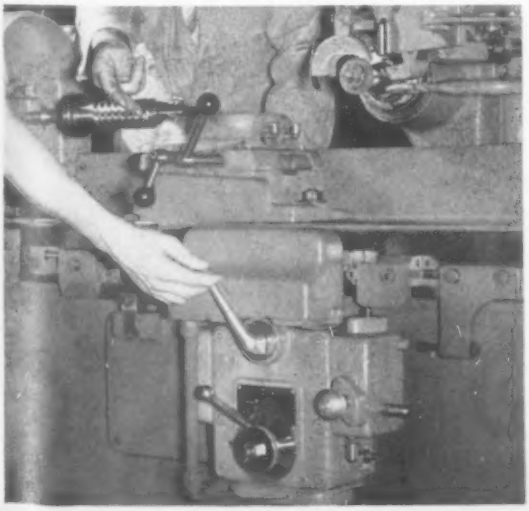
Below: Machine for milling the curved back of turbine blades. Feed and rapid traverse are all automatically controlled hydraulically. Sundstrand photo.

Below: Six-way drilling and reaming machine consists of a rigid base on which are mounted hydraulic units, self-contained. LeMaire photo.





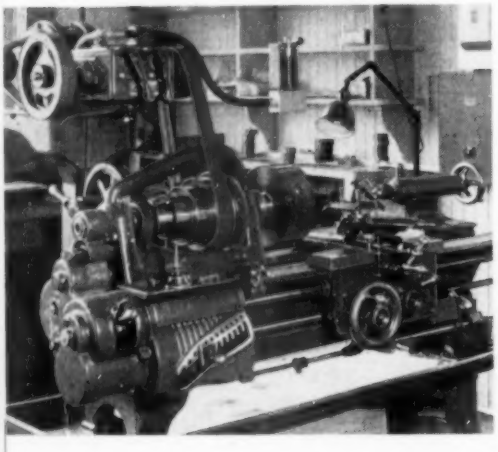
Below: Control assemblies have provided machine tools with an infinite range of feeds, traverse rates, spindle speeds and sequence arrangements. Vickers photo.



Three-way, 3-spindle unit-type machine has reduced the machining time on airplane engine crankcase nearly 75 per cent. Hydraulic feed and drive are employed. W. F. and John Barnes photo.

Numerous applications of variable speed controls have resulted in increased production through greater flexibility of the machines. Reeves photo.

Below: Unit drives have been instrumental in eliminating countershafts and overhead lines, adding to adaptability of plant equipment. Turner photo.



VARIABLE SPEED DRIVES

THE BELT-DRIVEN variable speed drive has had the field largely to itself. Ingenious friction drives have been developed, one in particular employing metal to metal contact. Efficient while bearings are tight and surfaces true, they have missed acceptance, except for comparatively light requirements.

The V-belt variable drive can be incorporated as a unit with the machine, with infinite speed ranges between high and low. Ranges can be progressive—i. e., one can start at "low" and gradually increase the speed to the high limit, and vice versa. This is especially advantageous in the manufacture of insulated wire and cable, when take-up reels must be progressively slowed as the constantly-fed cable builds up on the drum.

Related to the variable speed drive, unit drives, such as are furnished as standard equipment, or are designed to convert, cone pulley and countershaft machines to individual drive, must be mentioned.

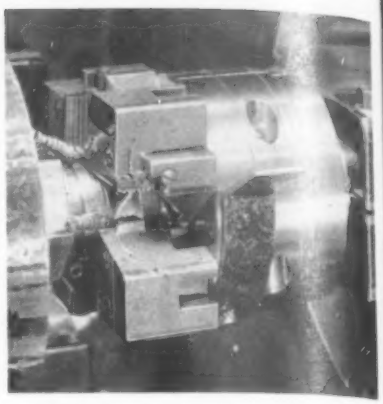
CUTTING TOOLS

CUTTING TOOLS are invaluable accessories, since they provide the teeth without which all machine tools would be impotent. Despite endless duplication and overlapping, no one grade can serve as an all-purpose tool for modern production. There are the (now) scarce 18-4-1 high speed steel tools and the moly alloyed high speed steel. The latter, at first developed as a substitute for the former, is now so highly refined and so consistent in quality that it will have a high place in postwar industry. Troubles encountered at first were largely due to unfamiliarity with the qualities and heat treating of the molybdenum alloys.

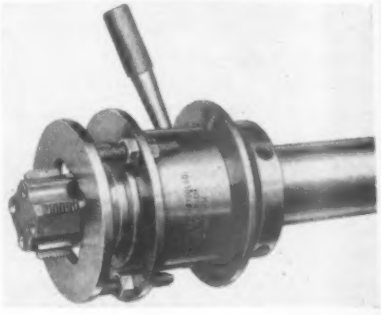
Complementing the high speed steels are various cast alloys and the sintered carbides, the latter graded from near-diamond hardness to the more shock-resistant types. Sintered carbides are largely superseding chilled iron and diamond dies in wire drawing, permitting speeds and feeds undreamed of previously.

In any discussion on the subject of cutting tools, taps and dies come naturally to mind. But here, too, there is considerable duplication, especially in solid taps and button dies. The collapsible tools, however, are confined to a few nationally known makes. All are high quality, and will perform satisfactorily if properly applied and if chasers are properly ground.

It has happened, and especially with some government alloys, that threads have been rougher than specifications permitted, but that was often caused by trying to cut the thread with one pass where two were required. With two passes, and a machine provided with a lead screw, for accurate engagement, one can obtain surprisingly smooth finishes even on jobs that ordinarily demand thread milling.



Collapsible taps have increased machine productivity and improved precision in threading. Landis Machine photo.



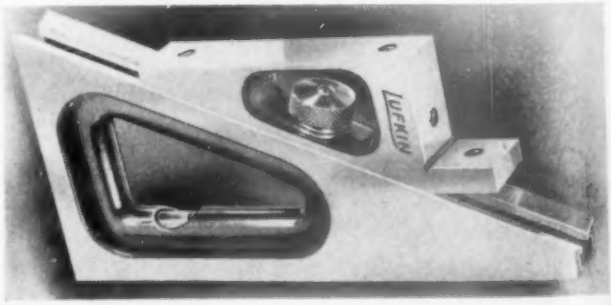
Instantaneous action of collapsible taps and quick withdrawal from the completed thread are advantages. Murchey photo.

GAGES

GAGES are natural accessories, and mass production would be impossible without them. Most of them are so standarized that description is unnecessary. Overlapping in their functions, many gages perform the same work as a competitive tool, but in a different way. Thus, the precision gage block and the optical gage will each check micro-inches, just as the micrometer and the dial gage will check thousandths and even tenths, with, perhaps, a greater range of flexibility accredited to the latter.

THE END.

A planer gage can be used with gage blocks to set up work on a surface plate; with sine bar to set tools; with an indicator for transferring measurements. Lufkin photo.

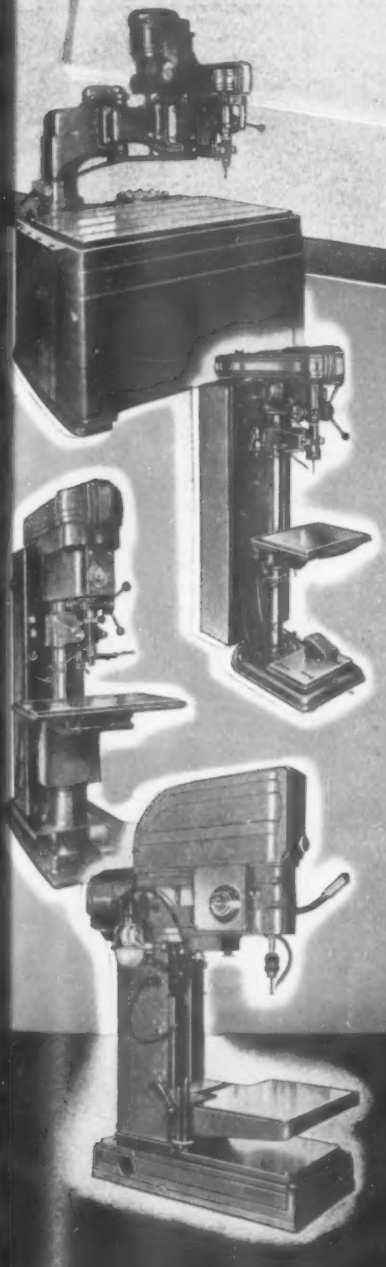


Important Announcement

TO THE METAL WORKING INDUSTRY:

New Revolutionary Tapping and Threading Machine to be Manufactured, Sold and Serviced by

Warner & Swasey



WARNER & SWASEY has acquired sole manufacturing and sales rights to the Bakewell Tapping and Threading Machine. The Bakewell Tapping and Threading Machine is one of the outstanding wartime developments in machine tools.

Precision parts for aviation engines and plane assemblies demanded extremely accurate threads (often up to class 5 gage fit in small holes). Critical materials—valuable time—were wasted because of a high percentage of rejections. Tap breakage was excessive—production was slowed down.

The Bakewell Tapping and Threading Machine was specifically designed to solve these serious problems. It introduced a new principle—a patented combination of a lead screw and solenoid actuated follower. It eliminates lead errors, backlash, and compensates for wear of the lead screw against the followers.

This improved Tapping and Threading Machine is a logical addition to the Warner & Swasey line. Threading or tapping is often the last operation on a finely machined part which has been accurately turned on a Warner & Swasey. Thread inaccuracies can mean the scrapping of a costly part and the loss of all the precision operations which have gone before.

Send for catalog or ask the Warner & Swasey field man to explain the many features and advantages of this revolutionary Tapping and Threading Machine.

WARNER & SWASEY TAPPING & THREADING MACHINE FORMERLY **Bakewell**

"Extreme Threading Accuracy on a Mass Production Scale"

4 Models: No. 0—0-80 to 8/32; No. 1—8-32 to 5/8; No. 2—3/8 to 1-1/2; No. 1R—8-32 to 5/8.

Takes all Standard Taps. Class 3, 4 and 5 Gage Fits Threaded in One Pass.

WARNER & SWASEY
Turret Lathes
Cleveland

Not a Lemon in a Blue Moon

A very good reason exists why you'll have a hard time finding a mounted point or wheel with hard and soft spots among those bearing the Bay State *blue flash* trademark.

Bay State manufactures mounted points and wheels in *blank* form then shapes, trues and sizes them after mounting on the mandrel, in contrast to other makers' method of *pressing* into shape. The finished product is sharp, smooth-running the instant you touch it to the work — no wasteful "breaking-in" period required.

In a broad range of abrasive products, Bay State offers extra advantages... the finest honing and superfinishing stones ever manufactured... portable snagging wheels with extra safety features... precision grinding wheels in fractional grades...etc. Plus engineering assistance to help you get the most from grinding.

Do you have the handy, pocket-sized catalog of Bay State Mounted Wheels and Points? If not, send right away, for Catalog D.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

BLUE FLASH GRINDING WHEELS *FAST and COOL*

HONING AND SUPERFINISHING STONES · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS
PORTABLE SNAGGING WHEELS · MOUNTED WHEELS AND POINTS · GRINDING WHEELS

PRODUCTION DATA SHEET

SHOP ABBREVIATIONS

Aluminum	al.
American Standards Association	A.S.A.
American Wire Gage (B & S)	A.W.G.
Amount	amt.
Approved	app.
Approximately	appx.
Assembly	ass'y.
Babbitt metal	bab.
Bearing	brg.
Bolt circle	B.C.
Brass	br.
Bronze	bz.
Bushing	bush.
Button head	btn. hd.
Carburize	carb.
Case harden	C.HDN.
Cast iron	C.I.
Catalog	cat.
Center line	℄
Chamfer	cham.
Checked	chkd.
Cold rolled steel	C.R.S.
Constant	const.
Construction	const'n.
Commercial	comm.
Copper	cu.
Cyanide	cyan.
Cylinder	cyl.
Decimal	dec.
Detail	det.
Designer	des.
Diameter	dia.
Dimension	dim.
Drawing	dwg.
Drill	dr.
Drill rod	D.R.
Drive fit	D.F.
Engineer	Engr.
Engineering	Engg.
Fiber	fbr.
Fillister head	fill.hd.
Finish	*f* or *fin*
Finish all over	F.A.O.
Foot	ft.
Gage	ga.
Galvanized iron	Ga.I.
Grind	gr.
Harden	HDN.
Harden and grind	HDN. & GR.
Head	hd.
Headless	hdl's.
Hexagonal	hex.
High-carbon high-chrome	H.C.H.C.
High speed	H.S.
High-speed steel	hss.
Holes	hls.
Horse power	hp.
Hydraulic	hyd.
Inch (es)	in. or (″)
Inside diameter	I.D.
Left hand	L.H.
Locate	loc.
Long	lg.
Machine	mach.
Machine steel	M.S.
Malleable iron	Mal.I.
Material	mat.
maximum	max.
Minimum	min.
National Coarse	N.C.
National Fine	N.F.
National Extra Fine	N.E.F.
National Shape	N.S.
Number	no. or #
Oil hardening tool steel	O.H.T.S.
Outside diameter	O.D.
Pack harden	PK.HDN.
Part number	Pt.#
Pattern	PATT.
Phosphor bronze	phos.bz.
Pieces	pcs.
Pitch	P.
Pitch diameter	P.D.
Pound	lb.
Precision	pcn.
Press fit	P.F.
Purchase	pur.
Radius	rad. or R.
Ream	rm.
Required	req.
Revolutions per minute	rpm.
Right hand	R.H.
Root diameter	R.D.
Round	rd.
Round head	rd.hd.
Running fit	R.F.
Screw	scr.
Semi steel	s.s.
Shop order	S.O.
Shoulder	shld.
Shut height	S.H.
Slip fit	S.F.
Society of Automotive Engineers	S.A.E.
but in reference to metals, etc.	SAE.
Socket	soc.
Spring steel	spg. st.
Spring wire	S.W.
Square	sq.
Standard	std.
Steel casting	S.C.
Thread	thd.
Tool steel	T.S.
Torch cut	T.C.
Wringing fit	W.F.
Wrought iron	W.I.

● Abbreviations for much of the working vocabulary of the production engineer have never been standardized.

Some of the above abbreviations, such as those for common metals, are standard, and are included to provide a more complete list. Others, approved by certain authorities, must stand the test of users' general acceptance and application.

Ideas for changes and additions to this beginning effort will be welcomed, and where applicable, will be published. Particularly welcome will be suggested abbreviations applying to machines and cutting tools, for use on drawings and operations sheets.

NOTE: On this page is the twenty-ninth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

THE CRIB

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

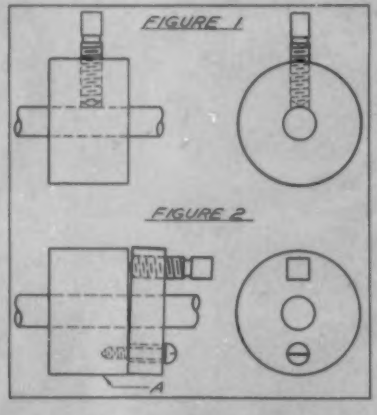
IDEAS · KINKS · SHORT CUTS

Improved Stop Collar Fits Snugly

TIGHTENING the screw on the old-type stop collar (1) frequently mars the rod. Unless the collar is extremely loose, it is also difficult to set accurately.

Since the improved collar (2) does not mar the rod, it can be fitted snugly, and adjustments can be made quickly and accurately.

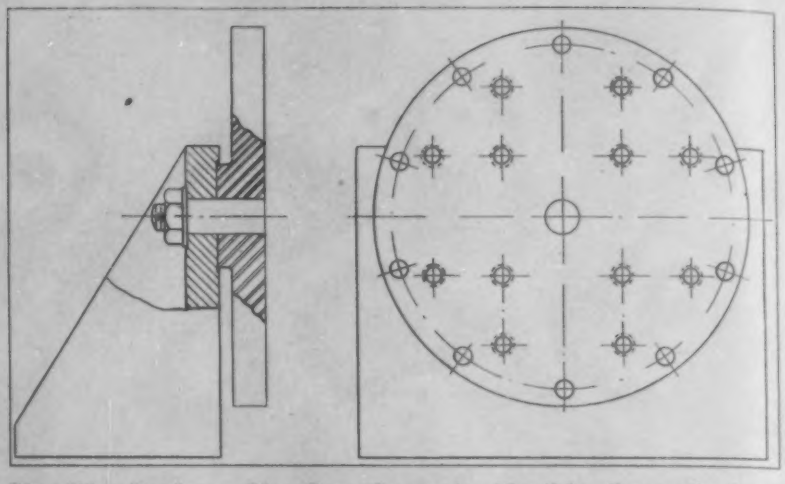
This collar can be made easily by using two pieces in approximately the proportions shown. The



larger piece should be bored so that it provides a slip fit on the rod, and it should have a tapped hole for the anchor screw. The small piece "A" should be bored slightly larger than the rod to provide a loose fit. This piece should have a clearance hole for the anchor screw and the clearance should be more than that which would be allowed normally, since greater movement results during adjustment.

On the side opposite the anchor screw, drill and tap for the locking screw. This will be in the small piece only. The anchor screw should not be drawn down tight, but should be loose enough to permit tightening on the rod by the adjusting screw.

●When you have an idea, short cut or kink, send it to THE TOOL ENGINEER. You will receive five dollars for each of yours that is published. Send your time-and-material savers to The Bramson Publishing Company, 2842 W. Grand Blvd., Detroit 2, Michigan.



Sine Disc Replaces Sine Bar; Accurate, Flexible, Convenient

A SINE DISC has been used successfully in place of a sine bar, with accuracy and flexibility.

A disc with holes jig bored on an accurate circle is set on a pivot mounted on an angle plate. Additional tapped holes are provided for mounting the work. Several sizes have been made, but one with 10 holes 36° apart on a 10" diameter circle is most useful.

There is always a hole not more than 18° from the horizontal center line, above or below it. In use, place two pins in diametrically opposite holes and bring one of the surfaces to be checked against a straight edge resting on these pins. Clamp the work piece in this position for checking angles.

Rotate the disc until the second surface of the angle to be checked is horizontal. Use an indicator on a height gage stand. Place a pin in the hole nearest the horizontal center-line and measure the height to the top of the pin, using the height gage and indicator and a stack of gage blocks.

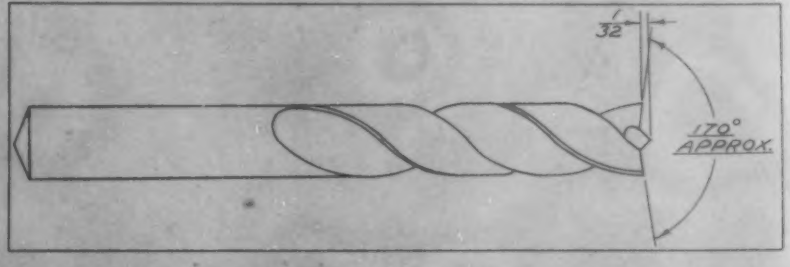
The angle between the work surfaces is calculated using the height to the top of a pin on the horizontal center-line, the height to the top of the pin in its second position, and the number of holes skipped. This method will check angles near 90° which are rather awkward to measure on a sine bar.

Drills Thin Stock Without Seizing; Minimum of Burr

FREQUENTLY in drilling a large hole in thin stock the drill tends to seize, or to produce a three-sided hole.

The operation can be performed easily by grinding a standard twist drill to produce a concavity of approximately 170° included angle in the bottom, with a 90° point in the center. The point should project about 1/32", and the web should be thinned slightly.

This tool will produce a round hole with a minimum of burr, and will not catch. Its effect, following break-through, is comparable to that of a punch pushing out a thin slug after shearing.



IS MAGNESIUM A WAR BABY?

Less than one-fourth the weight of iron, magnesium has a war record of revolutionary functional advantages which promise increased attention from designers. Fabricating problems are outweighed by ease and economy of forming and machining

RELATIVE MACHINING COSTS

CASTING MATERIAL	MATERIAL COST	LABOR COST	TOTAL COST	SAVING IN COST
A CAST IRON	$ 8.30	$66.62	$74.92	
DOWMETAL	29.04	40.53	69.57	$5.35
B CAST IRON	9.05	66.97	76.02	
DOWMETAL	30.10	41.00	71.10	4.92
C CAST IRON	0.75	7.00	7.75	
DOWMETAL	2.69	5.00	7.69	0.06
D CAST IRON	0.83	8.00	8.83	
DOWMETAL	2.08	6.00	8.08	0.75
E CAST IRON	2.80	41.00	43.80	
DOWMETAL	8.50	32.00	40.50	3.30

This comparison of machining costs was made by a manufacturer of automatic packaging machinery. Each of the five different reciprocating parts was similar in design when cast from iron or Dowmetal magnesium. The figures are proof of the savings that can be achieved due to the remarkable machinability of the light metal.

Dow Chemical photos

"The lightest structural metal", magnesium is only 23 per cent as heavy as iron, and only 63 per cent as heavy as aluminum.

WALLACE SCOTTEN
ASSOCIATE EDITOR

THE METAL-WORKING INDUSTRY may have a new lightweight champion. Aluminum, once the title holder, now has a bantamweight contender.

Making its first appearance in the pages of metallurgical history little more than a century ago, the bantamweight magnesium did not enjoy extensive use as a practical fabricating material until its weight advantages were recognized during the first world war. Even then its use was restricted largely to flare shells in which the highly combustible character of magnesium in powdered form proved advantageous. At that time seven concerns undertook its production in the United States and consumption rose to 284,000 pounds. The end of war production brought magnesium's first boom to a hasty conclusion. By 1927, only one producer of what is now known as "industry's lightest structural metal" remained in the western hemisphere.

Between the wars, German industry, backed by a paternal government, probed continuously in the field of magnesium research. In the U. S., the task of developing both production and utilization of the metal—at least one-third lighter than any other—was left largely to the Dow Chemical Company, whose brilliant founder, Dr. Herbert Dow, never lost sight of its possibilities.

Today, interest in magnesium stems largely from the fact that to blacken the skies with the greatest war fleet of all time, the American aircraft industry has lifted the metal into second place among light metals on the basis of consumption, with domestic production of the metal skyrocketing to more than 265,000 tons—70 times its pre-Pearl Harbor level. This fact alone is highly significant to post-war industry.

Compared with our steel capacity, which exceeds 90,000,000-tons annually, magnesium output may appear insignificant. But look at this light metal from the standpoint of savings in certain fabricating costs, reduction in product weight and the availability of raw materials, and the differential

STARRETT TOOLS

Starrett Tools HELP PROTECT

Here is a STARRETT "Last Word" Dial Indicator doing an important inspection job for PAN AMERICAN.

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RELATIVE MACHINABILITY OF STRUCTURAL METALS

Horsepower per Cubic Inch of Metal Removed per Minute

MATERIAL	Planning	Drilling	Milling
Dowmetal	1.00	1.00	1.00
Bearing Bronze (70Cu-25Pb-5Sn)	1.51	1.20	1.36
No. 12 Aluminum Alloy	2.21	1.69	1.57
No. 31 Aluminum Alloy	2.58	2.21	1.56
Yellow Brass (70Cu-27Zn-2Pb-1Sn)	2.22	2.02	2.58
Brass Screw Stock	2.26	1.76	2.10
Cast Iron	4.08	3.41	3.05
S.A.E. 1112	5.89	4.91	6.13
Steel Screw Stock	7.03	5.45	5.36
S.A.E. 1020	6.88	6.50	5.83
Copper annealed	7.49	10.00	5.49
Nickel "A"	12.35	13.00	9.06
Monel metal	13.32	8.20	8.72

Photo, right: **Magnesium can be turned on a lathe at speeds up to 5,000 feet per minute. With machines operated at top speed, unbelievably heavy feeds and cuts are employed. Note the fine finish despite the heavy cut in this operation.**

in current output seems less significant. The potential supply of magnesium is so nearly unlimited that it challenges imagination.

Because of the weight factor, magnesium output currently is limited almost exclusively to aircraft. Every one of the more than 8,000 planes rolling monthly from U. S. assembly lines involves the use of the silver-white metal—in the framework, or engine, or both. To meet this demand, a dozen more plants have been built to supplement the long-time producer, The Dow Chemical Co. Midland, Mich. Nonetheless, Dr. Willard Dow, son of the famed chemist and present head of the company, can point with pride to the fact that the concern still is turning out more than 50 per cent of the metal produced in the U. S.

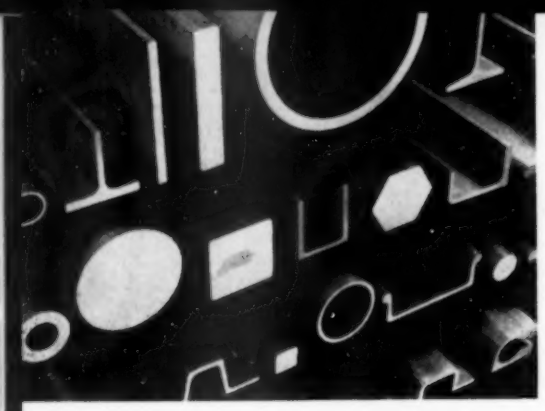
Since Dow alone has such a substantial stake in the future of magnesium, we first sought opinion there on the potentialities of the metal as a mass production fabricating material for civilian goods. Though Dr. Dow, and all his co-workers, reflect the conservative character of this research-inclined organization, each of them gave us the same answer. "Magnesium is no war baby!"

To prove that, after an inevitable early post-war slump following the evaporation of boom business in aircraft, American industry will not attend the funeral of magnesium, Dow engineers point to startling characteristics of the metal, pre-war uses, and greatly advanced war-born fabricating techniques.

First, inexhaustible supplies of magnesium raw materials indicate the metal is here to stay. Seawater, now an important source, is unlimited, and there is no indication that the magnesium-bearing brines now being worked in Michigan, and known but untouched reserves in the Southwest, will run dry for generations. In addition, there are virtually inexhaustible deposits of dolomite rock, another source in the country.

Cost, a highly important factor, has witnessed a steady decline since

Advocates of magnesium point to lower machining costs than with any other metal. Cutting pressures are so low that heavy cuts can be taken at top machine speeds. Drilling speeds up to 2,000 feet per minute are used successfully on magnesium.



Magnesium may be fabricated by all conventional methods — sand, permanent and die casting; forging; stamping and turning. The metal in alloy forms for specific jobs is available in ingots, extrusions and sheets. A variety of Dowmetal magnesium standard bar shapes and extrusions is pictured.

a figure of $1.81 per pound in 1918. Today, it stands at 20.5 cents per pound and producers hope to push it lower.

Many producers of civilian products are waiting for the government to remove restrictions on magnesium, of which they were using upwards of 11,000,000 pounds in 1939. The war production experiences of some have led them to proffer the opinion that they will substantially boost their post-war requirements. For example, pre-war industrial applications included packaging and textile machinery, foundry flasks, conveyer belts, portable tool cases, and loading platforms. Consumer products applications were made in vacuum cleaners, typewriters, chair frames, camera magazine cases, and airplane, bus and truck bodies.

But how, you may well ask, can peacetime requirements be lifted to any considerable portion of current magnesium output?

Without doubt, the requirements of war have increased our knowledge of magnesium's possibilities. Where the first war might be said to have fathered its production, this war has fathered its utilization.

Further, as one engineer at Midland prophesied, "As more and more production men become acquainted with the handling of magnesium, it can be expected that there will be substantially less resistance to using it in a great and expanding variety of productions."

Obvious and best selling point for magnesium before the war was light weight. It is only 23 per cent as heavy as iron, and only 63 per cent as heavy as aluminum. Structural magnesium alloys—using up to 10 per cent zinc, aluminum and manganese —have a specific gravity range of 1.74 to 1.83. Thus, magnesium producers long pointed to possible uses wherever there was a mass in motion, as lightness leads to reduced operating costs, less vibration, and more payload. Such selling directed the metal into high-speed machinery, transportation units, and hand tools and appliances.

Considered on the basis of weight, magnesium's relatively high price per pound becomes less a factor of concern. Dow engineers point out that on the basis on which metal is used—that of volume—you can divide its cost by five in comparing it with iron. Using this yardstick, at current ingot prices, magnesium ranks second only to iron. Aluminum, zinc, and copper follow in that order.

Compared with aluminum, its companion metal, magnesium is stiffer and stronger, weight for weight. Since the rigidity of a metal increases with the cube of a metal's depth, a pound of magnesium may be as much as 2.55 times as rigid as a pound of aluminum.

But until war-production crowned magnesium bantamweight champion, industry overlooked an even stronger selling point. The simple truth became apparent that even where weight does not matter, lower machining and certain fabricating costs (than with any other widely used metal) made its use highly advantageous.

And that is where the production engineer—the man who must fabricate with the material—enters the picture of magnesium's potentialities. The consensus among producers indicates the metal will find new uses just as rapidly as production men recognize its workability and develop additional methods of fabri-

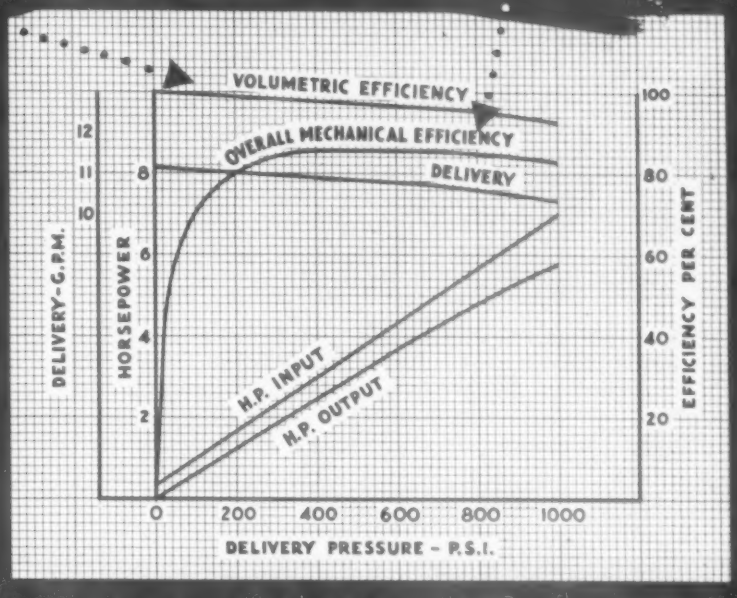
Photo, left: **This light metal can be gas, arc or spot welded. In the latter operation, electrodes must be kept clean with emery cloth, and surfaces that contact the electrode must be absolutely clean. Production welded assemblies are chemically treated after welding.**

RELATIVE WEIGHTS OF STRUCTURAL STEELS

Material	Specific Gravity	Relative Weight	Pounds per cu. in.	Pounds Per cu. in.
Dowmetal	1.8	1.0	0.965	112
Aluminum Alloys	2.8	1.6	0.101	175
Zinc	7.1	3.9	0.256	443
Cast Iron	7.2	4.0	0.260	450
Tin	7.3	4.1	0.264	456
Steel	7.9	4.4	0.285	493
Brass	8.5	4.7	0.307	531
Bronze	8.8	4.9	0.318	550
Nickel	8.9	4.9	0.322	556
Copper	8.9	4.9	0.322	556
Lead	11.3	6.3	0.408	706

HIGHER VOLUMETRIC EFFICIENCY...

HIGHER MECHANICAL EFFICIENCY:



Typical curves shown are for V-104-D pump at 1200 rpm; curves for other models are similar. Above curves are for oil having viscosity of 150 S.S.U. at 100° F., temperature of 120° F.

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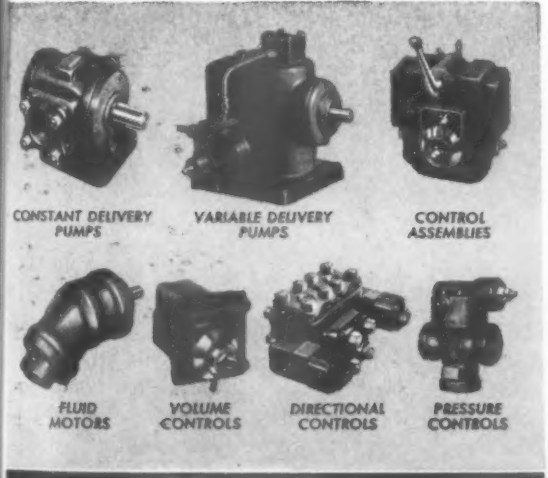

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Other important advantages of Vickers Balanced Vane Type Pumps include: (1) Hydraulic Balance which cancels out bearing loads and means much longer pump life, (2) cartridge assembly contains all pumping parts that move and is important to the simplicity, easy inspection and minimum maintenance of these pumps, (3) compact, yet rugged, (4) automatic wear take-up, (5) temperature adaptability, etc. Ask for Bulletin 40-25a for all the facts about Vickers Balanced Vane Type Pumps.

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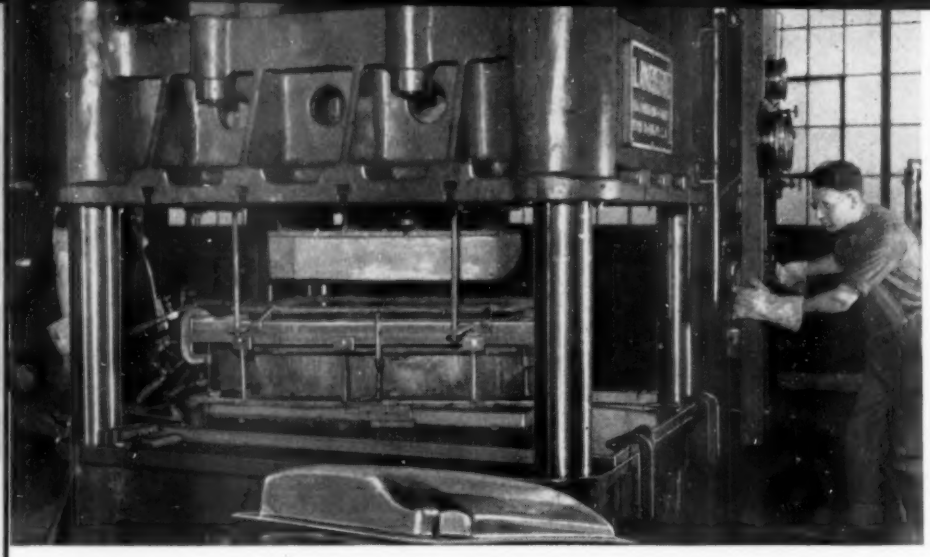

One of magnesium's potentialities lies in the relative ease of forming from sheet. When heated to about 650° F., only one die is required to finish intricate shapes to extreme tolerances.

cating it easily and economically.

For proof of this, makers of Dowmetal—the Michigan concern's name for its own magnesium alloys—point to innumerable instances in which machining costs with the light metal were so low that manufacture of machine parts from magnesium proved to be substantially cheaper than from cast iron or steel.

Typical of such cost records is one showing comparative figures obtained in finishing iron and magnesium castings for five different reciprocating parts for an automatic packaging machine.

Total savings through reduced labor-costs in machining magnesium amounted to as much as $5.35 per part, although the original magnesium cost $29.04 and the cast iron cost but $8.30.

MACHINING CHARACTERISTICS

Due to the good machining characteristics of magnesium alloys—said to be better than in any other commonly used metal—extremely high machining speeds and heavy cuts may be used. Standard machining operations invariably produce fine surfaces, less power is required for a given amount of machining than for any other metal, and long tool life is obtained.

Accepted procedure for machining magnesium differs somewhat from standard practice on other metals. These differences are made necessary by its properties of high coefficient of thermal expansion, low modulus of elasticity, low heat capacity, and the presence of fire hazard when using high cutting speeds.

Experience has proved that practically all machine tools can be run at their maximum speeds and with feeds at the full capacity of the machine. Cuts as heavy as ½-inch at feeds of 20 feet per minute down to lighter cuts at 700 feet per minute are being used for turning these alloys. Obviously, such excellent machinability contributes to lower overall cost of completely finished castings or pieces turned from bar stock.

Smooth finish is obtained without difficulty, and in machining castings, hard spots are rare and porosity is unknown. Though British practice calls for dry cutting, all experience in the United States tends to the use of carefully selected coolants.

To obtain full advantage of the excellent cutting characteristics of any of the magnesium alloys—certain types of which producers recommend for specific jobs—cutting tools with larger than usual clearances and extremely smooth tool faces are desirable. For machining production quantities of the metal, less tool equipment is required than for any other commonly used metal.

The excellent machinability of magnesium makes the metal in bar stock well suited for parts turned out on automatic screw machines. Because of the superior machinability, such parts frequently are lower in cost than aluminum alloy screw machine products.

Forms in which magnesium alloys are available permit utilization of all standard fabricating techniques—sand, permanent mold and die castings; extruded bars, rods and irregular shapes; plate, sheet, and strip up to four feet wide, and press and hammer forgings.

The metal can be gas welded, arc welded, or spot welded. One of the most interesting war-born developments in magnesium fabricating is the helium arc welding process (The Tool Engineer, October, 1942), in which the weld area is shielded from air by inert gas and a tungsten electrode.

Further development in utilization of the metal may well lie in the field of stamping, for here certain characteristics make it an unusually workable material. All severe forming is done hot. Annealed material can be form-drawn into intricate shapes when heated to about 650° F., while hard rolled sheet must be formed at temperatures below 400°.

The advantage in forming magnesium alloy sheet hot lies in the elimination of multiple press operations. Extremely deep draws—more than 1½ times the diameter of the stamping—are made in one operation. Though actual press operation is slower, production stamping is much faster than with other materials because only one die is required for any finished part. Tolerances obtained in this single draw are as high as may be obtained in any number of draws with any other material.

COUNTLESS POTENTIAL USES

Far from exhausting the possible uses in war production, fabricators are finding additional uses for magnesium in aircraft and naval vessels. The advantage of light weight and low machining costs are warranting its use in many ways in fighting equipment.

Such utilization, producers of the metal point out, only enhance its potential possibilities as a mass production material. Through use, and only through use, they say, will economical methods and uses of magnesium be developed.

Dow engineers sum up the advantages of magnesium this way:

1. Light weight—allows more pay load, reduces power requirements for reciprocating parts.

2. Machinability—easiest of all metals to cut.

3. Versatility—it can be fabricated by practically all the usual methods.

Though born in the caldron of conflict, magnesium hardly looks like a war baby to production engineers who have used it. THE END

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A.S.T.E. ANNUAL MEETING PROGRAM ANNOUNCED

☆ Emphasis is placed on technical sessions scheduled for society's 12th Annual Meeting at Philadelphia, March 26 - 28 ☆

IN ANNOUNCING completion of convention plans, officials of the American Society of Tool Engineers predict unusual interest in the technical program scheduled for the organization's 12th Annual Meeting at Philadelphia, March 26-28 inclusive.

Streamlined to meet war-time conditions, the meeting is designed to conserve the time of engineers who will attend, some of whom are expected from as far as the West Coast. At the same time, it was pointed out, the program should enable the maximum amount of interchange of technical information useful in expediting war production.

Thus, five technical sessions on new metal cutting techniques and methods designed to expedite production and cut manufacturing costs will be packed into the last two days.

THEME IS V-DAY TOOLING

"Theme of the meeting is V-Day Tooling", Ray H. Morris, president of the society said in commenting on speakers and subjects scheduled for the technical program. "In view of the fact that no machine or tool exhibition will be held in connection with the meeting," he said, "unusual effort has been devoted by society officials to the technical sessions. Consequently, we believe they will equal or surpass in interest any previously presented by the Tool Engineers".

Especially newsworthy among the dozen speakers scheduled for the technical symposiums is Bill Jack, whose revolutionary production methods and personnel management have made his company, Jack & Heintz, a real enigma in the realm of mass manufacturing (See THE TOOL ENGINEER, September, 1943).

Jack, who is currently using his outstanding production record as a cudgel in his fight against renegotiation, will speak on "Production Tooling and Personnel" at 8 P.M., March 27. He will be introduced by C. V. Briner, A.S.T.E. 2nd vice president.

In announcing the technical program, Douglas D. Burnside, 1st vice president, in charge of the program, pointed out that while the subjects scheduled should help materially in cutting costs and speeding war production, they should prove especially important when competitive civilian manufacturing is resumed.

TECHNICAL SESSIONS will be held in Philadelphia's Bellevue Stratford Hotel, the convention headquarters. Here is a brief outline of the subjects and speakers, as announced by Burnside:

● **Monday morning, March 27:** "Engineering, Planning, Tooling, Production and Inspection of an Intricate Aircraft Mechanism". Headed by J. W. Humphrey, factory manager, a group of five engineers from the National Cash Register Company will trace in detail each step in the manufacture of one of the U.S. Army's "secret" weapons. "This panel," it was said, "will reveal the complete job of tool engineering from blueprint to final inspection on a piece of equipment that we cannot name in print". E. V. Johnson, A.S.T.E. national secretary, will be session chairman.

● **Monday afternoon:** "Metal Finishing". A. F. Hasty, Sunnen Products Company, will discuss smaller types of machines and processes used in honing. Machines and processes used on large jobs will be described by K. W. Connor, Micromatic Hone Corporation. National president Ray Morris will be session chairman.

● **Monday evening:** Bill Jack of Jack & Heintz.

● **Tuesday morning, March 28:** "Variable Machining Controls". Engineers from Westinghouse Electric and Manufacturing Company will reveal new uses of electronic variable speed controls.

R. A. Cole, Norton Company, will discuss electronic controls as applied to grinding machines. Use of electronic controls on milling machines will be the subject of a talk by B. T. Anderson, Sunstrand Machine Tool Company. Session chairman will be 1st vice president D. D. Burnside.

● **Tuesday afternoon:** "Metal Removal". New techniques in fly cut milling will be presented by Ralph R. Weddell, Weddell Tools, Incorporated. A. Burgan, American Broach and Machine Company, will talk on war-born innovations in broaching. Floyd W. Eaton, ASTE national treasurer, will serve as chairman.

THOUGH THE MEETING formally convenes Sunday, March 26, several business sessions are scheduled for the previous day. A number of committees will meet Saturday, including one to name candidates for the election of national officers held the following day.

New officers elected for 1944-45 terms will be inducted at the Annual Banquet, to be held in the Bellevue Stratford ballroom in the evening, March 28. J. H. Van Deventer, president and editor, The Iron Age, is scheduled as banquet speaker. A.S.T.E. president Morris will act as chairman, and past president T. B. Carpenter will be toastmaster. Host will be William J. Gamble.

Committee chairmen in charge of convention arrangements, Adrian Potter, executive secretary, announced, include: General Chairman, A. E. Berdick; Assistant General Chairman, T. J. Donovan; Attendance, H. W. Gross; Entertainment, L. W. Widmann; Plant Visitation, C. O. Hersam; Publicity, J. C. Sorensen; Reception, F. M. Crayton; Technical Sessions, W. B. Rapp; Hotel Reservations, J. McMonagle; Banquet, F. H. Jennings; Advisory, P. W. Frankfurter, Sr.

Along with the announcement that a machine and tool exhibition will not be held in conjunction with the Philadelphia meeting, society officials reiterated the statement made earlier that plans are being made for holding "the largest exhibition in the history of production equipment, tools and machines, approximately 90 days after the end of the war in Europe".

THE END

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CAPITAL COMMUNIQUE

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T. N. SANDIFER

Special dispatch from THE TOOL ENGINEER'S *Correspondent in the nation's capital.*

WASHINGTON

THE special provisions to meet the problems of machine tool manufacturers, which the industry requested in view of the peculiar conditions resulting from the war, were omitted from the renegotiation section of the tax bill, as it was finally adopted and sent to the White House.

What is not generally known is the reason advanced by Representative Vinson, of Georgia, in reporting the various sessions in conference on the bill, for this particular action. He said:

"The retroactive exemption of the machine tool industry not only would have permitted such companies to conduct their future operations free of profit restrictions, but also would have restored to them millions of dollars of admittedly excess profits which they had already given the Treasury."

This is quoted because it probably did not get into print through regular channels.

CALLED A "COMPROMISE"

Perhaps the verdict can best be given in the words of another House member, who commented, "I think the Army and Navy are about the only people who are satisfied. Certainly we are not satisfied" —he was obviously speaking from the Republican side of the chamber—"but we think that next year, when we are in control of the House, we'll fix things."

As a matter of fact, the Republican House leader said the resulting renegotiation feature of the bill, in his understanding "was a compromise". He added that he would like to know if it was acceptable to the Army and Administration generally. He was told that it was certainly acceptable to the Army, Navy and Procurement division of the Treasury.

PROBLEMS NOTED BY COMMITTEE

Analysis of the tax bill in general indicates it does not change the earlier existing provision for post-war reserves, or at least that is the claim.

Elsewhere around Congress there are signs that the members are trying to look at facts common to the machine tool and other industries. The Senate Special Committee on Post-War Economic Policy and Planning, earlier this month, stressed its finding that many factories have their entire working capital tied up in one phase or another of war contracts, and will require funds, one way or another, in order to reconvert and carry on peace-time operations.

"Still others," said the committee's report, "have filled their plants with government machinery which must be moved out so that their own machinery can be moved back in. Still others have sold, at the instance of the government, machinery not needed for war production but which must be replaced before peace-time production can be resumed."

This last point, it will be noted, checks closely with what major manufacturers using mass production machinery have been telling Congress, as reported here from time to time.

WHAT TO DO WITH PLANTS?

Another point noted in this committee's study, which checks with suggestions from plant management, is the suggestion that the potential uses of all government-owned plants should be determined, i.e., which should be sold, which retained by the government, and which not immediately usable. Plans should then be ready to convert available plant space into warehouses for storage of government-owned machinery, inventories of various kinds, and other materials in the way of a quick change-over.

As to disposal of surplus Government-owned tools themselves, the Murray bill on this subject has not at this writing reached the stage where hearings are scheduled. No date has been set, although early action is anticipated. When such hearings are called, it is understood the Senator wants to hear the opinion of industry on the problem.

As may be recalled, this bill provides for a commission, classification of equipment as to its suitability for retention by the government, its sale to smaller firms on reasonable terms, and disposal to training establishments.

It is now evident that the Smaller War Plants Corporation will attempt to figure in re-conversion plans. If this idea is followed up, it might put the agency in a better position to tackle its projected job than has been the case with the one it was intended to take on.

Its friends in Congress point out in its behalf that the SWPC did not come into existence soon enough to exert much influence on the industrial transition from peace to war. By the time it did begin operating many major commitments had been made with larger units which were well-launched on production schedules.

This made it more difficult to get business for the smaller plants and, as one summary of the situation expressed it, "the accomplishments of the Corporation have not been as large as they might have been had it been formed in 1940 or 1941."

MIGHT HELP SMALL CONCERNS

The chairman of the War Production Board, in commenting on the Corporation's possibilities, in the course of a report to Congress, has just pointed out that "The Corporation is well situated to intercede in behalf of the small plants as the process of converting back to civilian production gets under way."

That ends Mr. Nelson's reference to this possibility, but the suggestion might be read in connection with certain other developments — availability of surplus equipment, some of which might be channeled to small concerns on a basis to put them in efficient producing condition on peace goods, an idea in the minds of those now shaping plans for disposing of surplus machine tools.

On this point, the recommended policy of disposal of surplus goods generally, is that where practicable they should be sold in quantities that will permit their acquisition by small purchasers. Apply this principle to surplus machine equipment, and you have a medium of promoting the smaller plant into activity, runs the argument. The thought is apparent in numerous schemes now proposed, some in pending legislation.

EQUIPMENT DISPOSAL CONSIDERED

While the war's end is still conjectural at this date, all talk of how to clear plants of government-owned stuff continues to have the same note of urgency. Thus, one such recommendation, by a Congressional committee, demanded that "unless previous arrangements have been made for their retention by the contractor, Government-owned machinery, tools, equipment and inventories should immediately be removed from privately-owned plants" when the time comes.

"The fact that no adequate storage facilities exist for them should not be a deterrent to the accomplishment of this purpose. Privately-owned plants moved their machinery into the weather to accommodate Government machinery.

(Concluded on page 110)

FROM THE WASHINGTON VIEWPOINT . . . .

- Post-war machine tool market implications disregarded in renegotiation clause of tax bill. Individual congressmen concerned about plans for aiding re-conversion, urge more consideration of industry's financial and re-tooling problems. The Senate Committee asks speedy removal of government machinery.

Industrial opinion will be asked on Murray bill for disposal of excess machine tools. Participation in reconversion by Smaller War Plants Corporation visualized in re-birth of that agency. Watch attack on "cartels".

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While you may still be "up to the hilt" in war production, you should start thinking about your plans for tomorrow.

A few ways we can help you: we can design a new product or redesign an old one, introduce new plant equipment or rearrange old, develop economies in manufacturing methods or processes, design new dies, fixtures, tools.

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—CAPITAL COMMUNIQUE—

(Continued from page 108)

and if necessary to prevent the shutdown of private plants, the Government should do the same with its property."

In any conflict of interest, under this policy, re-opening or conversion of plants to enable them to furnish normal employment would get the right of way.

A case is being tried in a Washington court by the Department of Justice which has developed an interesting question on machine tools of American and other origin.

SKEPTICAL OF UNTRIED TOOLS

It involves a company being prosecuted by the Government incident to a war contract. As pertinent evidence, it was testified that British tools worth several million dollars were made available to industries on this side which expected to engage in certain production. Without getting into the intricacies of the case too deeply, some of its issues revolved around the use or failure to use such tools, and evidence was adduced that American firms were unwilling to make the change-over incidental to using this equipment, involving, it was claimed, use of untried and unfamiliar equipment. They preferred, so the testimony ran, to use American-make tools.

TOOL PERFORMANCE ON TRIAL

On the other hand, government testimony tended to show that this British equipment was considered first-class, and that there was no obstacle to its adoption for the purpose intended, and a large part of it was so used, it was claimed, by various contractors.

The case is just getting under way, but undoubtedly a major issue will be the part that machine tooling had in the performance or failure to perform the contract.

One aspect of the Government's onslaughts on so-called "cartels" may hint at lowered costs of cutting tool metals at some future time. This phase of the investigation has gone at some length into the part that artificially-maintained international price agreements have had on tool steel components. Certain "tips" were mentioned, for which at one time the cost was said to be above $50 a pound, and the alleged manufacturing cost $8.

LOOKING INTO "CARTELS"

As a result, according to a letter quoted by the Department of Justice official who surveyed the cartel situation for Congress, one engineer of a major American company complained, several years ago, that "the principal reason for these various vendors not selling their tools for machining steel which is such an important item in the machine shop industry . . . . is that the prices they have to maintain for the Carboloy does not allow them to put out Carboloy enough to stand machining operations on steel."

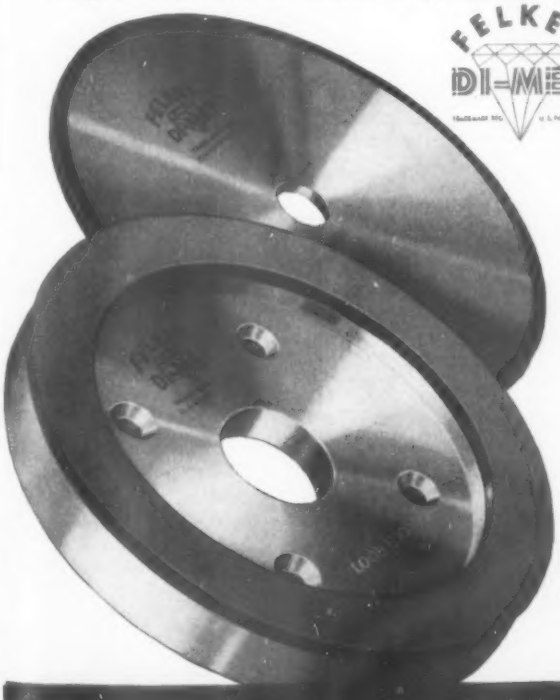
That, it should be emphasized, was a reference to a pre-war situation, but today's cartel investigation is delving into the effect of such restrictions on war production. The fact that today many such patents are held by the Alien Property Custodian may indicate that an effort will be made later to alter the accepted picture, as it existed, at least.

THE END

NO SABOTEUR -but a SLACKER!

This dull carbide tip is robbing some manufacturer of production, causing unnecessary rejects, putting needless wear and strain on a machine . . .

There's no need for lost production from dull or broken carbide tools . . . or any necessity for sending them out for regrinding. DI-MET diamond wheels can generally be used on the high speed grinders in the shop . . . are easy to use . . . quickly remove broken or worn edges and chipped areas . . . produce superb cutting edges that can't be matched by use of ordinary abrasives!



FELKER DI-MET

DI-MET resinoid bonded diamond wheels will not craze carbide surfaces. They cut many times faster than silicon carbide—are highly economical because of their exceptionally long life and ability to hold size.

WRITE FOR THIS CATALOG—it provides many operating tips on using diamond wheels—shows the many DI-MET wheel sizes and types and gives prices and discounts.

FELKER MANUFACTURING CO.
1121 BORDER AVE., TORRANCE, CALIF.

MANUFACTURERS OF DIAMOND ABRASIVE WHEELS

MACHINE TOOLS

. . . news and trends in the Machine Tool Industry . . .

PRODUCTION TRENDS

● Despite lower output, backlog is cut 14 per cent by industry

Continuing their steady decline since their 1943 peak of $125,445,000 last March, machine tool shipments dropped in the closing month of the year to $60,680,000.

The value of December's total output was 15 per cent below the preceding month's corrected figure of $71,811,000, according to compilations by the Tools Division of the War Production Board. Significantly, the peak in wartime machine tool shipments was reached 12 months earlier, in December 1942. The value of units produced that month was set at $131,960,000.

Of more interest to the trade, however, was the fact that WPB figures showed that less and less ink is being used in new order books. For the fourth consecutive month total firm orders continued to fall off, this time to $33,746,000, or approximately 10.5 per cent less than the November total of $37,705,000.

Cancellations—the industry's bugaboo—totaled $6,942,000 in December, or 16 per cent more than November's $5,979,000 in cancellations.

Despite the industry's acceleration of direct and sub-contract war work, approximately 375 machine tool builders chopped off another sizable portion of their backlog of unfilled orders. At the end of December, the figure stood at $211,751,000, fully 14 per cent below a backlog of $246,000,000 at the start of the month.

FASTER AND FASTER

● Revolutionary 60,000 rpm motor for high-speed grinders

● PITTSBURGH — Westinghouse, which usually makes machine tool news with its annual spring "machine tool forum," last month secured the industry's attention with the announcement of a revolutionary motor.

Described by engineers here as the world's fastest industrial motor—revolving 1,000 times a second—this new unit is expected to speed production of aircraft engines and other precision-built war equipment.

Designed by Robert M. Baker, Westinghouse Research Laboratories, the new 60,000 rpm motor is especially suitable for driving high-speed grinders.

Such grinders now are powered by larger, slower motors connected to the grinding wheel shaft by belts and pulleys. These belts tug at the grinder, sometimes pulling it out of alignment. They often break because they must be thin and pliable to bend around the small pulley on the grinder shaft. The new high-speed motor would drive the grinder directly, Westinghouse engineers say, thus eliminating production delays for belt replacement and increasing grinding accuracy.

To meet millionth-of-an-inch tolerances required in finishing aircraft engine parts, according to Baker, the grinding wheel must cut effortlessly and smoothly, something that can't be accomplished at low speeds. Many of these grinding wheels are less than an eighth of an inch in diameter, no larger than those used in dental work, but they must attain high speeds at their grinding edge. Experience has shown, he said, that the best grinding speed is about a mile a minute on the face of the wheel.

The new motor is said to be 20,000 rpm faster than any now being built for industrial use. There are several devices that turn faster, but they are almost laboratory curiosities.

In the future, Baker claims, grinders may have to turn even at higher speeds as tolerances grow smaller. Consequently, another motor is being designed that will turn 120,000 rpm. Although only the size of a sixteenth-horsepower motor operating on ordinary electric current, the grinder motor develops 80 times that much power at its top speed.

Water flowing through a jacket that surrounds the motor and its bearings keeps the compact power unit cool. The bearings are lubricated by a pump that forces oil through the space between shaft and bearings, a gap of less than two thousandths of an inch. Current is supplied by motor-generator sets having an input frequency of 60 cycles per second. THE END

HIGHER SPEEDS FOR GRINDERS

Robert M. Baker, Westinghouse engineer, checks the speed of new 60,000 rpm motor designed to power high-speed grinders.

● For the interest of TOOL ENGINEER readers, who are buyers and users of machine tools, leaders of the machine tool industry have been invited to present their views on possible post-war trends of the industry.

NEW REQUIREMENTS IN DESIGN and PERFORMANCE

☆

HUGO L. OLSON
PRESIDENT
SUNDSTRAND
MACHINE TOOL COMPANY

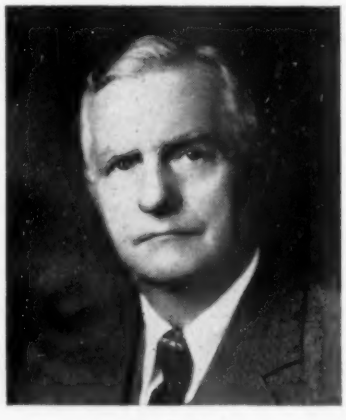
THE outlook for the machine tool industry is somewhat obscure today because so much depends on the outcome of the war. When either Germany or Japan is defeated, men and materials will be released for civilian production. To date, it is still questionable when this will happen.

However, when the time comes, there will still be a demand for new machine tools, and in order to compete in the post-war machine tool market it will be necessary to meet new and exacting requirements from a design and performance standpoint.

Present indications are that new cutting tools will require more rigid machines, capable of higher speeds, feeds and horsepower capacity.

In the Pump Division—manufacturers of Sundstrand hydraulic equipment—new designs are now undergoing tests. Due to their wartime applications, these designs are restricted and confidential at present, but they will definitely have post-war applications.

In addition to these, new and better hydraulic devices will be developed for machine tool applications.



MR. OLSON

" . . . new and better hydraulic devices will be developed for machine tool applications. . ."

Coast to Coast Service and Supply

Legend
19 Authorized Distributors
96 Tool & Parts Manufacturers
Carboloy District Offices and/or Resident Representatives
Look for the trademark CARBOLOY (or the trademark) on the tools you buy. It is your assurance of Authorized Service and Genuine Carboloy Cemented Carbide

CEMENTED CARBIDES manufactured by Carboloy Company are available to you under this nationwide 3-way plan of distribution that provides maximum service and availability throughout the entire range of carbide use:—

1. *Through Distributors:* Authorized distributors in important metal-working areas carry stocks of Standard Carboloy Cemented Carbide Tools, Blanks, Dressers and Masonry Drills and offer complete technical service through factory-trained representatives.

2. *Through Tool Manufacturers:* Leading tool and parts manufacturers are authorized to supply their products, covering practically all types of special —often patented—tools, cutters and gages, as well as many miscellaneous parts—equipped with Carboloy Cemented Carbides.

3. *Direct Carboloy Service:* Direct service by Carboloy Company is provided by a large staff of experienced sales and service engineers operating throughout the country.

Put this comprehensive system of service and supply to work for your plant. Specify "Carboloy" for your cemented carbide requirements.

ARMY E NAVY

CARBOLOY

TRADEMARK

TRADEMARK

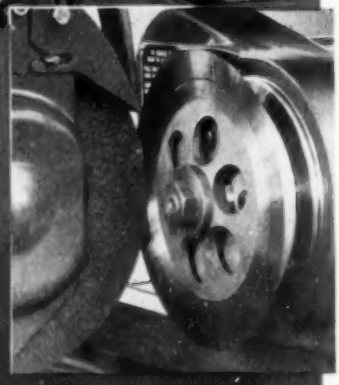
TUNGSTEN CARBIDES . . . TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES

CARBOLOY COMPANY, INC., 11147 E. 8 Mile Road, Detroit, Michigan

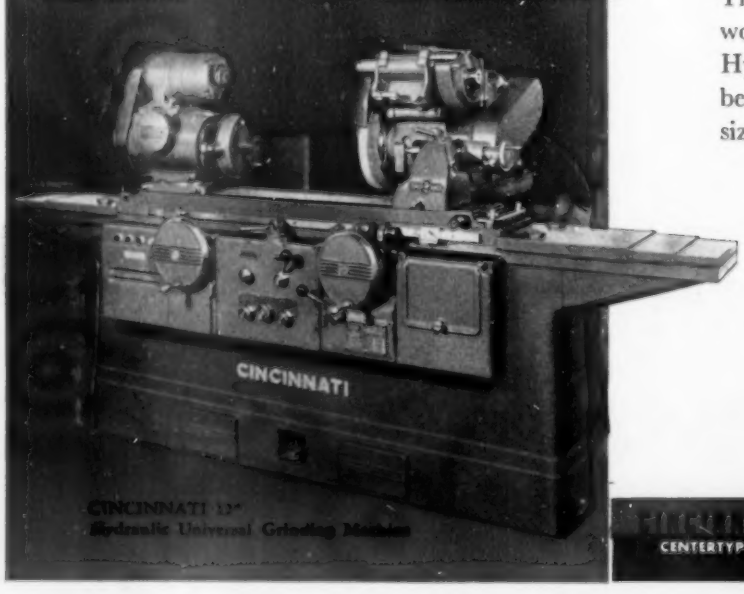
BIRMINGHAM 3, ALA. CHICAGO 7 CLEVELAND 4 DETROIT 32 LOS ANGELES NEWARK 2, N. J. PHILADELPHIA 22
PITTSBURGH 19 SEATTLE 4, WASH. THOMASTON, CONN.

Below: An Internal job. Here the Internal Grinding Attachment has been pulled down into position for grinding the bore in a short shaft to an accurate plug-gage fit. The attachment is standard equipment always in place and may be set up at a moment's notice.

Above: An External job. Grinding the taper—3½" per foot—on the shank end of an attachment driving gear. Notice the Internal Grinding Attachment on the front of the wheelhead. The attachment is up and out of the way but ready for instant use.



Right: A Face grinding job on the CINCINNATI Hydraulic Universal.



CINCINNATI 12"
Hydraulic Universal Grinding Machine

Give Your New Product A BREAK in the Toolroom

The first few samples of your new product for tomorrow's market must be made on machine tools, in the *tool room*. There, they pass through their most critical period. There, the product can be started on its way to success or failure. With versatile and up-to-date tool room machines for manufacturing the parts, the chances are that the performance of the assembled unit will equal blue-print specifications.

CINCINNATI Hydraulic Universal Grinding Machines have all the qualifications for tool-room work of this type. They will size accurately, within .0001", and produce exceptionally smooth finishes with no extra effort. Changes from external to internal or face grinding may be accomplished in a few minutes. The table continually reverses within .004", enabling the operator to confidently grind close to shoulders.

These few statements give you an idea of the fine work which can be produced on CINCINNATI Hydraulic Universals. Complete information may be obtained by writing for catalog G-486-1 (12" size) or G-474-1 (14", 16" and 18" sizes).

CINCINNATI

CENTERTYPE GRINDING MACHINES CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES

INDUSTRIAL NEWS DIGEST

. . . a review of significant developments and new techniques in mass production industries . . .

NEW SOCIETY

● Plastic tooling engineers organize; announce plans

NEW YORK—Plastic tooling, one of the least publicized war-born aids in volume production of aircraft, was given added impetus as a post-war method with the formation here February 1 and 2, of the National Society of Plastic Tooling.

The new society is holding its charter membership open for invited west coast and other industrial area participation. Delmar Anderson, Superintendent of Production Planning and Tool Design for the Buffalo, New York, plants of Curtiss-Wright Corporation, was elected president. Four other major aircraft companies participating were Bell Aircraft Corporation, Consolidated-Vultee Aircraft Corporation, Grumman Aircraft Engineering Corporation, and the Glenn L. Martin Company.

Anderson stated that although 'plastic tooling' was largely developed by warplane firms, brought about by critical tool steel shortages, the cost saving factors and its adaptability should make it a boon to many manufacturers outside the aircraft industry.

"It is the aim of this society to bring together for the first time those practical men who are responsible for the development of 'plastic tooling' as a recognized production process," he said. "These men, in most instances, have worked individually. The free exchange of their respective 'know-how' should greatly accelerate its further development."

Elected Vice-president of the new organization was Thomas A. Herbert, Superintendent of the plastics, plaster and foundry departments in the Allentown, Pennsylvania, plant of Consolidated-Vultee Aircraft Corporation. Harry W. Tomkins of the Curtiss-Wright Corporation was named secretary, and Charles H. Miller of Bell Aircraft Corporation, Buffalo, New York, treasurer.

Harry W. Tomkins, Public and Internal Relations, Curtiss-Wright Corporation, Buffalo 5, New York, is handling inquiries.

METAL POLISHING

● Electrolytic processes said to eliminate tedious work

WASHINGTON — A newly patented process called "electrolytic polishing" will take the elbow grease out of polishing metal surfaces, the Baltimore — Washington branch of the Electroplaters Society was told.

Dr. Charles L. Faust, of the Battelle Memorial Institute, Columbus, Ohio, where the process was developed, told the group at its annual meeting here that electrolytic polishing will produce surfaces of high reflectivity on steel, nickel, copper, brass and zinc at relatively low cost and without laborious hand polishing or machine buffing.

He said that the new process dissolves away ridges and imperfections on metals, leaving a lustrous surface, and that it can be used on objects of intricate shapes, inaccessible to polishing by ordinary methods.

Wide utilization of the new technique was visualized in the manufacture of civilian goods in metal working industry.

GEARING INDUSTRY

● Association announces annual meeting, reports volume firm

PITTSBURGH—The gearing industry, as represented by members of the American Gear Manufacturers Associa-

(Continued on page 117)

Show-How Charts Speed War Work

Show-how illustrations by Willard Lund, Westinghouse Lamp Division, reduce training time of new workers, speed production and improve quality.

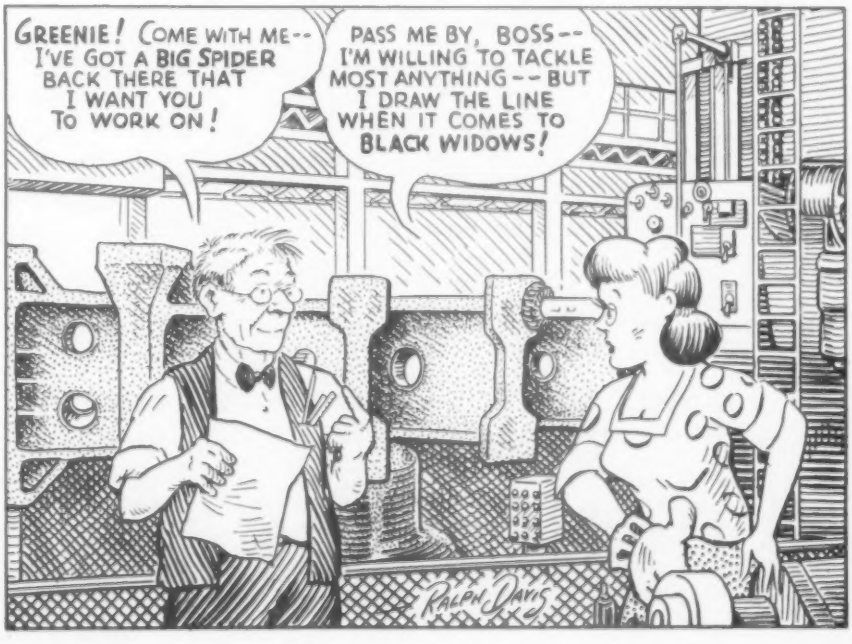
● The same technique mail-order schools use in teaching hand crafts is being used to translate specification sheets into step-by-step explanations of manufacturing operations. Used in the Westinghouse electronic laboratories and factory, the charts have proved invaluable in teaching assemblies.

With the aid of charts, two shifts of two operators were taught a new brazing operation in a single day. Before, the job was done by a slower method that required three days to train one operator. Another example: a simple chart depicting a joining operation so clearly that rejections were reduced approximately 25 per cent.

One reason for the success of the charts, developed by Willard Lund, is the fact that the operator learns to perform the operation before drawing it.

"GREENIE" *Not a Lady's Job*

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY


GREENIE! COME WITH ME-- I'VE GOT A BIG SPIDER BACK THERE THAT I WANT YOU TO WORK ON!
PASS ME BY, BOSS-- I'M WILLING TO TACKLE MOST ANYTHING--BUT I DRAW THE LINE WHEN IT COMES TO BLACK WIDOWS!
RALPH DAVIS

Die Sets don't sing

IN G.I. QUARTETTES

American Servicemen—soldiers, sailors, and marines, will sing—nothing will stop them—no more than anything will stop them in their drive to victory.

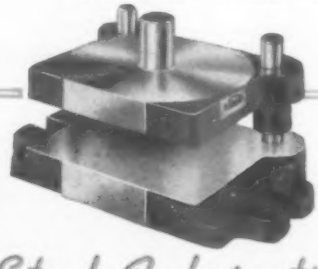
Behind-the-line products that never get to the front, Danly Die Sets are stamping out and forming millions of parts for implements of war that will shorten the drive to victory for those tough, laughing, fighting men.

If you need die sets in your production, call Danly. Our facilities and services are still increasing to serve your immediate needs.

Call Danly:

CHICAGO ..... *Lawndale 7440*
MILWAUKEE ..... *Broadway 1644*
DETROIT ..... *Cherry 6666*
CLEVELAND ..... *Express 0300*
DAYTON ..... *Fulton 6651*
ROCHESTER ..... *Main 2554*
PHILADELPHIA ..... *Radcliff 2323*
LONG ISLAND CITY ..... *Ironsides 6-8080*
DUCOMMUN METALS & SUPPLY CO.
Los Angeles . . . *Kimball 0181*

DANLY MACHINE SPECIALTIES, INC.
2100 So. 52nd Avenue • Chicago 50, Cicero, Illinois



DANLY DIE SETS

Welded Steel Fabrication

(Continued from page 115)

tion, showed the same volume of sales for December, 1943, as for November. December sales, the Association states, did not include turbine or propulsion gearing. The index figure for the month remained at 387. November business, it was reported previously, exceeded the October volume by five per cent.

Simultaneous with announcement of production figures, the Association revealed that the 28th Annual Meeting of the organization has been scheduled for May 22-24, at Rye, New York.

Recently added to the Association's membership, it was stated, were The National Tool Company, Cleveland, and Worthington Pump & Machinery Company on behalf of its Moore Steam Turbine Division.

PLANT SAFETY

● WPB launches program to reduce manpower loss

WASHINGTON—The War Production Board and the Department of Labor are pooling their forces to reduce the toll of industrial accidents that annually result in a loss of life six times as great as the nation sustained at Pearl Harbor.

In announcing the anti-accident program, WPB chairman Donald M. Nelson said, "In 1943, 56,800,000 man-days were lost from essential production and 18,400 workers died because of industrial accidents. This vital blow at America's war production goes unrecognized by too many of us who were shocked into instant action by the loss of 3,303 lives among our armed forces at Pearl Harbor.

"Management, labor and government must eliminate the menace of industrial accidents," he said, "which yearly strike down a division of our soldiers of production. Such a defect on the production line cripples our war effort just as certainly as a major military defeat in the field."

The anti-accident campaign will be handled by the WPB's Industrial Health and Safety Section. Private groups participating in the work are the U. S. Chamber of Commerce, The National Association of Manufacturers, the National Safety Council and labor unions (See The Tool Engineer, page 99, February 1944).

PRESSED METALS

● Institute studies future pressed metal markets

CLEVELAND—Looking to the future, O. L. Earl has been appointed as Market Development Engineer in connection with post-war problems and planning of the Pressed Metal Institute. The announcement was made by W. W. Galbreath, Executive Vice-President of the Institute.

Under Earl's direction, an engineering and market-development program will be undertaken by the Institute in the interests of further cooperation with the government in redesigning war materiel to stampings, and in locating available facilities and manpower in the pressed metal industry to facilitate production, it was announced.

Especially significant is the fact that Earl will assist the industry in the task of translating wartime production experience into wider use of stampings in post-war consumer goods.

The Institute believes that impressive economies in materials, machines and manpower being realized in war production through the use of pressed metal can be carried over into the manufacture of lower cost articles of all types when civilian output is resumed.

Committees are being appointed, according to the Institute, to study new developments in materials, methods and markets which affect the future of the pressed metal industry, especially as regards the use of new ferro alloys, new light metals and new clad metals.

Earl, who is thoroughly familiar with the pressed metal industry, assisted in securing the services of specialists and executives for the Tank Automotive Center, Detroit.

MATERIALS

EQUIPMENT DISPOSAL

● Maritime Commission announces details on disposal program

WASHINGTON—Establishing a unified procedure that may indicate an

(Continued on following page)

NEW TOOLS AND NEW METHODS TO MEET PEACE-TIME COMPETITION

●Too much praise cannot be given the American cutting tool industry for its production efforts since Pearl Harbor. Because many readers of The Tool Engineer magazine, who are buyers and users of cutting tools, are interested in the post-war outlook for this industry, some of its leaders have been invited to present here their views.

☆

F. G. GEPFERT
PRESIDENT
BLACK DRILL COMPANY

FROM the standpoint of the development of new tools and methods applied to cutting metals, the period since Pearl Harbor has been the most active in history.

Faced with a heavily increased demand for war goods, manufacturers have turned to these new tools and new methods to save man-hours and conserve critical metals. Under the stress of war-time production they have learned much.

After peace has been consummated, America will enter the most competitive period in its history—competition between corporate units in the same industry, between different industries, between old and new makers of a product, between old standbys and new or substitute materials, and between domestic and foreign manufacturers and industries.

If we, as a people, are as intelligent as I think we are, we shall apply the knowledge we have accumulated during the months of war to the solution of our competitive peace-time problems. We shall be doing things that before the war would have been thought impractical or impossible.

Take one of our own products as an example. We make a special drill that drills holes in steels hardened by any method to Rockwell "C" 40 or harder, without the necessity of annealing. Five years ago it was just an idea in the experimental stage. Today, it is in use in thousands of plants producing war goods. Tomorrow it will be used on millions of parts going into many products among America's growing home-front needs.

". . . machine tool builders are redesigning their units to utilize the new cutting tools developed . . ."

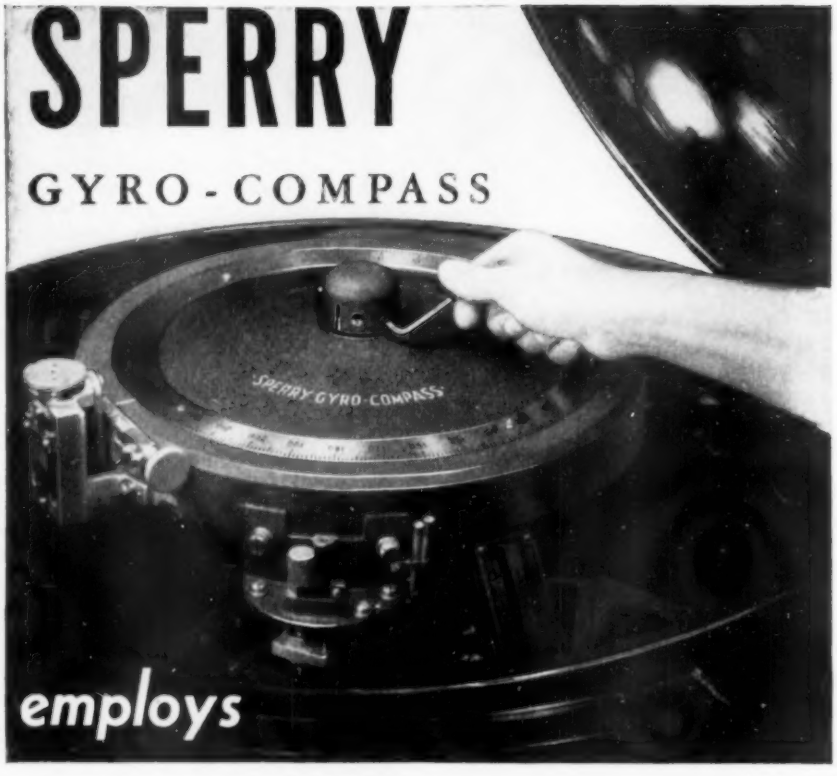
And manufacturers, knowing that hardened parts can be drilled on a production basis, will find that because such parts match perfectly, assembly costs will come down to help them meet competitive prices.

Now, many machine tool builders are redesigning their units for higher speeds, faster feeds, closer tolerance work and ample power to utilize to the utmost the qualities of many of the new cutting tools developed in the last few years. No manufacturer can dare overlook these machine tools when they become available in the competitive days ahead.

Technological development gets its greatest impetus during war. It is up to industry to carry over into post-war production the worthwhile new tools and methods that will help America lick its peace-time problems.

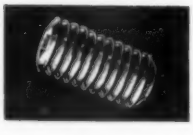
SPERRY

GYRO-COMPASS



employs

ALLEN



HOLLOW SET SCREW

in suspension head

SPERRY Gyro-Compass derives its directive force basically from the earth's rotation and pull of gravity, not its magnetic field. This directive force, the true north determinant, is 150 times greater than that which actuates the magnetic compass. Immune to local magnetic attractions, it is free from variation and deviation, and unaffected by motion of a vessel. It enables the helmsman to steer a true course with less rudder, with less power expenditure, and greatly simplifies the problems of the navigator.

Manifestly this instrument, unerringly responsive to natural laws, embodies a superlative degree of mechanical precision in its parts, in its assembly and its adjustments. In its suspension head, as shown in the photo reproduced, an ALLEN Set Screw ensures the accuracy and fixity of a critical adjustment.

Allen Hollow Screws distributed only through local Industrial Distributors in all centers.

THE ALLEN MANUFACTURING COMPANY
HARTFORD, ★ ALLEN ★ CONNECTICUT, U.S.A.

(Continued from preceding page)

eventual pattern for war plant equipment disposal, the Maritime Commission has announced a plan for disposal of its surplus property.

The Commission's procedure gives first preference in obtaining material to contractors in shipbuilding, then to other government departments, war contractors, industries reconverting to civilian production, and last to competitive bidders.

Excess supplies are to be segregated at the shipyards until use or sale of unrequired property is made. When local storage facilities are overburdened, material may be shipped to Maritime Commission warehouses, after consideration of handling and transportation costs.

Before any requisitioned material is purchased for contracts now, the Commission has announced, unrequired property inventories will be checked so that material on hand may be utilized.

When the WPB requests that available material be sold to firms engaged in essential war activities, or in reconversion to civilian production, a negotiated sale, without competition, may be authorized. Otherwise, property will be advertised for sale with invitations issued for public bidding. Such sales will be conducted by district purchasing officers of the Commission. These are located in New York, Baltimore, Norfolk, Seattle, Savannah, Philadelphia, Chicago, New Orleans, Portland, San Francisco and San Pedro.

The Surplus Property Section in Washington will issue general statements of classes, quantities, and types of materials available, and will answer inquiries from other government departments or war contractors about materials on hand. Concerns wishing to receive statements must list the type of commodities desired. Names will be dropped from the list after five invitations to bid are sent with no reply received.

EXCESS MATERIALS

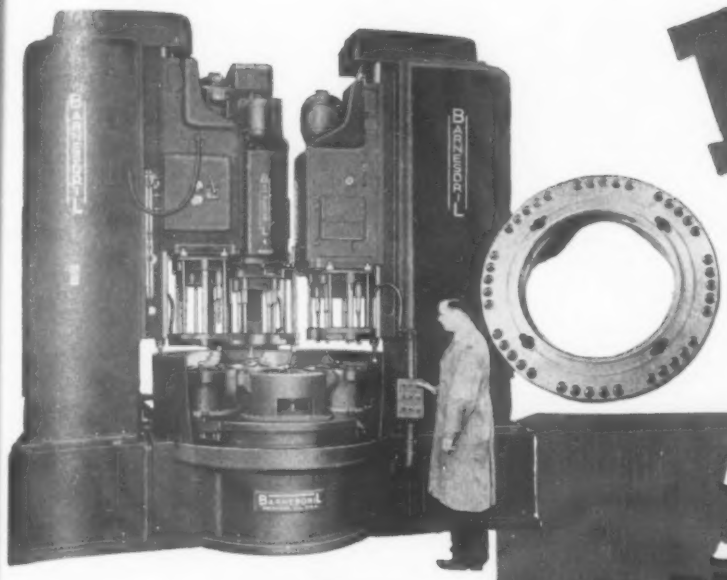
● Air Corps seeks market for surplus tools, equipment

CHICAGO — Faced with mounting surpluses of materials and equipment as a result of changing production requirements, the Army Air Forces Materiel Command has announced that it is seeking a market for such excess stocks.

Raw and fabricated materials, standard parts, motors, hardware, fabrics, precision tools, equipment and other surplus stocks are being offered for sale to high bidders by the Redistribution and Salvage Section of the Army Air Forces.

Companies interested in such materials, and who are desirous of having their names placed on the active bidders list, may write to the Army Air Forces, Materiel Command, Midcentral Procurement District, 111 West Jackson Boulevard, Chicago 4, Illinois: Redistribution & Salvage Section.

(Continued on page 120)



1 Used Vertically with Automatic Indexing Table

This BARNESDRIL No. 10, 3 UNIT, Hydraulic Production Machine with a 4-station rotating indexing table, shows how these Hydraulic UNITS will save many extra operations when arranged around an indexing table for progressive operations. This machine performs simultaneous drilling, reaming and counterboring operations on the inner circle of holes on the aluminum pump housing part shown at left. Uninterrupted production is obtained by using an automatic indexing table with a spare loading station. Our patented hydraulic decelerated control is used for hydraulically positioning table.

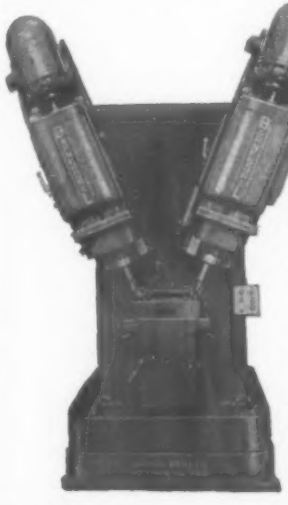
3 WAYS

BARNESDRIL

Standard Hydraulic Units are Adapted for Special Drilling, Reaming and Facing Operations

2 ed Horizontally

vn here is a BARNESDRIL No. 10 Self- ng Hydraulic Production Machine si one standard UNIT. Equipped n 8-spindle auxiliary head, this chine faces and counterbores 8 bosses simultaneously on airplane engine parts.



3 Used in Angular Position

Two standard units are used on this BARNESDRIL No. 10 Hydraulic Production Machine for drilling and counterboring 12 holes in propeller shafts. Each unit is arranged to give rapid approach, slow feed, and rapid return.

3 Sizes Available

These new units are regularly available in the following three sizes, motorized according to the requirements of the job:

No. 5 Unit . . . . . with 5 to 7½ hp. Motor.
No. 10 Unit . . . . . with 10 to 15 hp. Motor.
No. 20 Unit . . . . . with 20 to 25 hp. Motor.

Find Out How You Can Adapt These Machines to Your Work Send today for complete details and specifications of these new drilling UNITS. There is no obligation.

848-71 CHESTNUT STREET

Barnes Drill Co. ROCKFORD ILLINOIS, U.S.A.

McCROSKY'S CENTRALIZING V-LOCK permits: (1) location of the block in the bar with extreme accuracy; (2) close control of the amount of float for finishing cuts; (3) interchange of blocks in the bar without removal of the centering key.

McCROSKY ADJUSTABLE BORING BLOCKS are made in three styles—roughing, finishing, and extended (for boring ahead of the bar). There are five series in each style, with a total range of sizes from 1¼" to 15".

McCROSKY BORING BARS to hold McCROSKY Blocks are made in four styles—turret-type bars with straight and taper shanks, and piloted bars with straight and taper shanks.

For complete details ask for McCrosky Bulletin 16-B and the McCrosky Boring Bar Manual.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

INDUSTRIAL NEWS DIGEST

(Continued from page 118)

WASHINGTON—A catalogue of 30,690 new surplus steel valves of various sizes and types has been published for the use of war contractors or others by the War Production Board.

The list, compiled by the Surplus Program Section of the WPB Redistribution Division in cooperation with the Metals Reserve Company, indicates the type of valves, catalogue specifications, manufacturers' names and location.

The 50-page listing includes both multi-purpose and specific use valves. It is available for inspection by potential users in WPB's Regional or District Offices. Claimant Agencies also have copies of the catalogue available, it was stated.

SHARES STEEL OUTPUT

● Ford, only auto industry producer, sells output

DEARBORN, MICH.—The Ford Motor Company, one of the few mass production industries which produces a major portion of its own steel, now is sharing approximately 72 per cent of its steel output with other firms.

The use of other metals, notably aluminum and magnesium, in aircraft and tank engines, has enabled the company to share its steel output. Ford is the only automobile manufacturer to operate both open hearth furnaces and steel rolling mill. It supplied 75 per cent, the company states, of its own steel requirements for cars, trucks and tractors before the war.

INDUSTRIAL BUSINESS NOTES

INDUSTRY REPORTS

● News of expansions, purchases and new services

Los Angeles Tool repair: A tool repair division has been added by Aircraft Tools, Incorporated, Los Angeles, manufacturer of production and maintenance tools, Wade Miller, president, has announced.

The company says a complete stock of parts permits prompt repairs, and that all types of cutters will be resharpened.

* *

New offices: With the addition of four more District offices in Ohio, Pennsylvania and Indiana, Detroit Tap and Tool Company, manufacturer of thread production tools and machinery, now has seven Factory Branch offices.

The new Ohio office is in Cincinnati. Two offices are located in Indiana, one in South Bend and the other in Indianapolis. The Quaker State office is in Pittsburgh.

* *

Black Industries: Recently formed was the Mec-Rad Division of Black Industries, Cleveland, to manufacture the mechanical components of radionic devices.

In addition to this new division, Black Industries operates Black Boring

(Continued on page 122)

ASK US ABOUT THE POPE *Sealed Lubrication* SPINDLE FOR *Your* JOB

The right *grinder spindle* for your work may not appear on this page.

Give us an outline drawing or describe the spindle and let us have a few dimensions, a general idea of the machine, the method of holding wheel or tool, the speed, etc.

Then we'll send you carefully prepared, easy to fill out Data Sheets, upon receipt of which we can give you the whole story with cost and delivery.

POPE

REG. U. S. PAT. OFF.

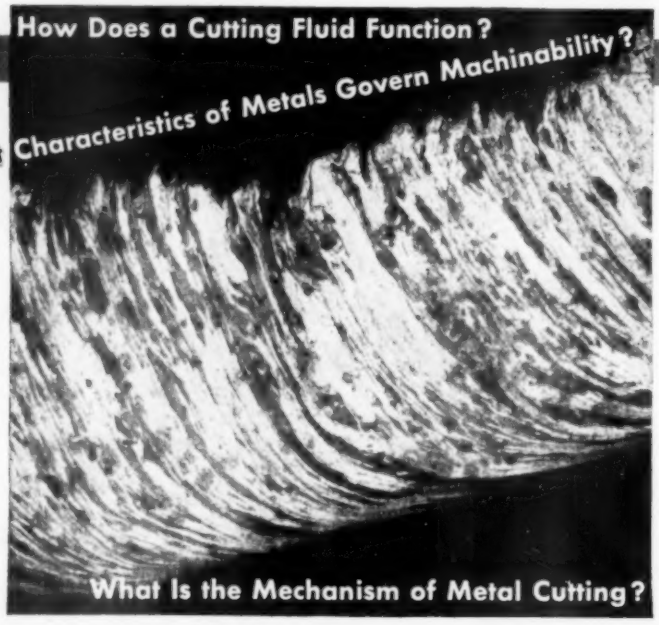
POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

Consider the Lowly Chip..


How Does a Cutting Fluid Function?
What Characteristics of Metals Govern Machinability?
What Is the Mechanism of Metal Cutting?

What Knowledge Its Gnarled Features Hide!

We're moved to poetic expression when we contemplate the great advances in metal-working which become possible as more and more is learned about the formation of a metal chip. Too long the chip has been taken for granted as just something which happens when you cut metal. Scientific investigation is bringing to light data which may greatly alter present day conceptions of tool angles, depth of cut, tool speeds, cutting fluids and other factors which are a part of metal cutting.

Through study of the metal chip come further answers to three fundamental questions: "What is the mechanism of metal cutting?" "What characteristics of metals govern machinability?" and "How does a cutting fluid function?"

We at D. A. Stuart Oil Co. are probing these mysteries with all the tools and techniques science makes available. We don't know all the answers yet, but we're learning them fast. As our research engineers inch closer and closer to the truth about the metal chip, their findings are reflected in improved cutting fluids—*to do a better job for you.*

A REQUEST OF STUART CUSTOMERS
Containers of all types are critically scarce. We urge you to cooperate with the W.P.B. program to conserve containers by observing these four rules for handling drums.
1. Do not drop.
2. Use a little oil to avoid stripping threads in removing plugs.
3. Replace plugs carefully when drum is empty.
4. Keep drums under cover when emptied.

We invite you to write for our new free booklet, "The 577th Oil," which contains twenty-two case histories, typical examples of how Stuart Oil Engineering is solving production problems (like your own), as well as other valuable metal-working data. Please state your name, company and title.

INDUSTRIAL NEWS DIGEST

(Continued from page 120)

and Machine Company, specialists in precision jig boring, and Black Drill Company, makers of drills for use on hardened steels.

Marine Motors: Builders of engines for more than a century, Cooper-Bessemer Corporation is producing Diesel engines and generating sets for more than 25 different types of fighting ships and supply vessels for the Navy, Coast Guard, Army, Maritime Commission, and Lend-Lease Authorities.

Cooper-Bessemer equipment, the company states, is being used in diversified types of craft, such as battleships and aircraft carriers, converted coastal yachts, and torpedo testing barges. In addition, two of the corporations plants are supplying compressors, steam cylinders, shell nosing dies, and machine tool castings for war production.

* *

Consolidation: In order to tie in more more closely its Detroit manufacturing unit with its Forging and Casting Division and its Detroit Sales Branch, Allegheny Ludlum Steel Corporation has established a new regional managership in the Detroit area.

H. G. Batcheller, president, announces that the new Detroit regional manager is H. N. Arbuthnot, formerly assistant general manager of sales.

* *

Name change: From Lincoln Park Tool & Gage Company to Lincoln Park Industries, Incorporated, has been announced by the organization. The management, personnel, and policies of the Lincoln Park organization are unchanged.

Announced simultaneously is the merger of Carbur, Incorporated, with Lincoln Park Industries, Incorporated. Cemented-carbide rotary files and cutting tools, formerly made by Carbur, Incorporated, will retain the "Carbur" identity, with future production handled as a departmental operation of Lincoln Park Industries.

* *

Moved: The Gray-Mills Company from its quarters in Chicago to a new plant in Evanston, Illinois. Acquired in the move were twice the floor space formerly occupied, adjacent property to assure increased capacity in the future, and railroad facilities. The company manufactures portable coolant systems for metal working industries.

* *

Expansion: Willey's Carbide Tool Company announces that it now is occupying a newly-built addition to its Detroit plant. The new addition triples original facilities and production.

* *

Growing Pains: Hole Engineering Service has moved to 13722 Linwood Ave., Detroit, with greatly increased space and facilities, according to Harry C. Satterthwaite, manager. The organization has the application engineering and exclusive distribution of several patented devices for making and finishing holes, and supplies engineering counsel and special equipment engineered to product and plant.

Started during the depression more than a decade ago, the organization now provides special equipment for holes from $\frac{1}{32}$" to 20" diameter, in parts weighing from a fraction of an ounce to approximately 20 tons.

(Continued on page 124)

Hardened shafts and rolls are quickly and accurately straightened on Cincinnati Press Brakes.

The set-up is simple and time saving—costs are materially reduced.

Write for further information on Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

. . . SOUND SLIDE FILM TODAY
it tells all about
TOOL STEEL WELDING

The Welding Equipment & Supply Company presents two sound slide films about tool steel welding that should be of vital interest to master mechanics, superintendents, tool process and tool conservation personnel, designing and method engineers, foremen and welding operators. These sound films are the only complete technical information available *anywhere* on the proper procedure and application of tool steel welding. Technical information contained in these films will help to save material, man hours, and eliminate production delays.

These sound slide films will be shown to your organization without obligation, by merely writing us on your company stationery for an appointment.

These films are also available for instruction use in schools and industrial plants at a nominal fee. Wire or write us today.

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

WELDING EQUIPMENT & SUPPLY CO.
223 LEIB STREET • DETROIT, MICHIGAN

INDUSTRIAL NEWS DIGEST

(Concluded from page 122)

Price Reductions: On standard stock lines of single-point, diamond ground tools, ranging as high as 40 per cent, have been announced by Tungsten Carbide Tool Company. The price slash, which became effective in January, makes the tools directly competitive in price with other standard tools, including high speed steel in many cases.

* *

Identification: A new identification mark, consisting of the words "Blue-Flash", plus a symbol of a lightning flash, has been adopted by the Bay State Abrasives Products Company, Westboro, Massachusetts, for its complete line of abrasive products.

To provide easy identification and to further emphasize the name, the mark will appear in blue. The new symbol will be promoted to the trade through trade publications and direct mail advertising and by use on all merchandise.

* *

Name Change: Stockholders of William H. Keller, Incorporated, have voted to change the name of the company located at Grand Haven, Michigan, to Keller Tool Company. W. H. Loutit, president announces that there will be no change in personnel or management of the company nor in its line of pneumatic tools.

* *

New Branches: Michigan Tool Company, Detroit, announces its expansion of factory service to include district offices in Indianapolis and Pittsburgh. A. Olson will be district manager at the Pittsburgh branch, and Joe R. Armstrong will be in charge of the Indianapolis office, according to Paul F. Zerkle, sales manager.

* *

Agency: Kent-Owens Machine Company, Toledo, has announced appointment of The Satterlee Company, Minneapolis, as exclusive agents for Kent-Owens milling machines in that territory. President of the Minneapolis firm, established in 1894, is C. C. Webster.

* *

Subsidiary: With the Ransome Machinery Company now a wholly-owned subsidiary of Worthington Pump and Machinery Corporation, better ordering and service information facilities are said to be available. According to Charles E. Wilson, Worthington executive, Ransome welding positioning equipment is now widely available through Worthington district offices in all principal cities.

* *

Appointment: New exclusive sales representatives in the North East have been announced by B. B. Quillen, president of the Cincinnati Planer Company. They are: for Northern New Jersey, Eastern New York, and Connecticut — Harrington - Wilson - Brown Company, New York City; for Massachusetts, Rhode Island, New Hampshire, Vermont, and Maine — Lynd-Farquhar Company, Boston; for the Syracuse area — C. H. Briggs Machine Tool Company, Incorporated, Syracuse; and for Western New York State — George Keller Machinery Company, Buffalo.

Representation for all this area was handled for 40 years by Henry Prentiss & Company, Incorporated, which recently retired from business.

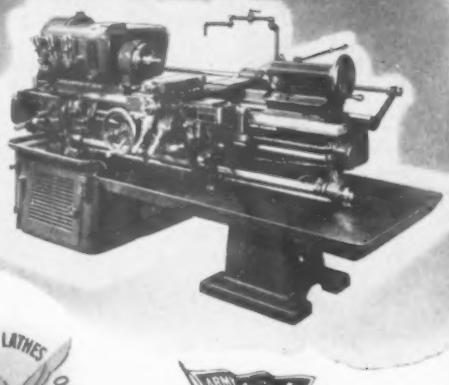
(Continued on page 126)

Double Duty in YOUR TOOL ROOM

. . . with the Lodge & Shipley Tool Room Lathe, equipped with Universal Relieving Attachment . . .

All the usual jobs, PLUS the ability to do—end, internal, external, plain, angular, or spiral relieving work. Investigate these advantages.

END RELIEVING



PLAIN RELIEVING

LATHES GOOD LATHES ONLY SINCE 1892

ARMY E NAVY

Original Navy "E"
Awarded March 6, 1942

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, OHIO, U.S.A.

ENGINE TOOL ROOM AUTOMATIC OIL COUNTRY LATHES

(Continued from page 124)

TOOL ENGINEERS HOLD WEST COAST CONFERENCE AND SHOW

★ Los Angeles meeting features technical sessions, machine and tool exhibit

LOS ANGELES—Three days of technical sessions and an extentensive exhibit of machines and tools were features of the first West Coast Area "Conference and Exhibits" held here February 15-17, by the American Society of Tool Engineers.

Success of the initial conference of tool engineers for the Pacific states was indicated by the official registration, which totaled 855, according to Adrian L. Potter, Executive Secretary of the Society.

With headquarters in the Biltmore Hotel, the Society's Los Angeles chapter presented a program featuring three days of technical sessions devoted to methods and materials, a banquet attended by 210 tool engineers and an equipment exhibit in which 28 prominent concerns presented displays. Demand for space in the exhibit, Mr. Potter said, exceeded available facilities.

ASTE President Ray H. Morris, who spoke at the Conference Banquet, expressed the conviction "West Coast tool manufacturing will soon become self supporting, and Los Angeles should become one of the country's important post-war industrial centers." Mr. Morris stressed the fact that tool engineers now are thinking in terms of conserving the natural resources of the nation, which have become dangerously depleted as a result of the fantastic expansion of war production.

At the Conference Banquet, Mr. Morris outlined the role tool engineers have played in achieving victory on the American war production front. He suggested that if the West Coast possesses the same initiative that motivated its great marine shipping figure, Robert Dollar, development of a strong post-war industrial economy is assured in the Pacific area for it already has the experienced personnel necessary for civilian industrial pursuits.

Technical sessions at the Conference featured nine speakers, all representatives of Western industrial organizations.

Subjects and speakers on the program included:

"Design Principles and Operation of Medium and High Production Dies". Speaker: Walter Kassebohm, Superintendent, Production Engineering Company. Chairman: A. J. Dennis, Chief Tool Engineer, Carbide Tool Manufacturing Company.

"Surface Finishing". Speaker: J. C. Fletcher, President, J. C. Fletcher Company. Chairman: A. D. Lewis, General Manager, Knu-Vise Products Company.

"Master Tool Dock and the Bryant System: Speaker: Leland Bryant. Chairman: M. W. Seavey, Tool Engineer, Lockheed Aircraft Corporation.

"Remarks about Machinability of Metals". Speaker: Dr. Morris Asimow, Chief Metallurgical Engineer, Central Metals, Incorporated. Chairman: Lester W. Deutsch, President, Aero Tool Company.

"Induction Heat Treating". Speaker: Karl Bues, Chief Engineer, Grove Regulator Company. Chairman: F. G. Jarvis, Tool Engineer, Douglas Aircraft Company.

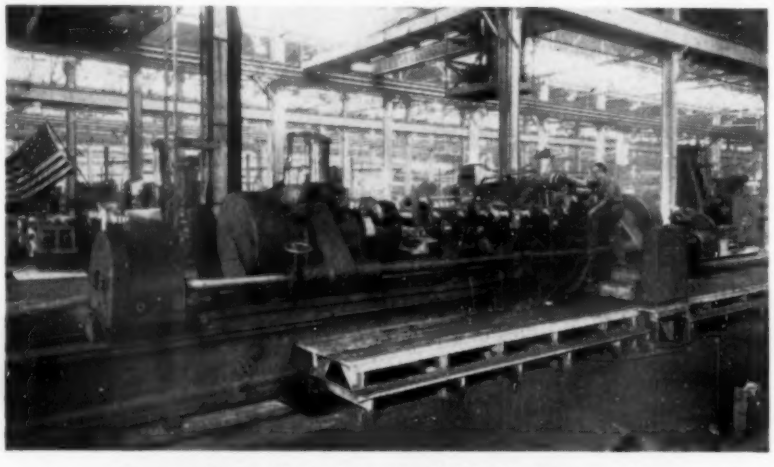
"Post-War Prospects for the West Coast". Speaker: L. A. Harvey, Harvey Machine Company. Chairman: Anton Peck, Tool Service Engineer, Jemison Steel Corporation.

"Tool Design-Research". Speaker: Dr. Robert Boden, Tool Research Engineer, Lockheed Aircraft Corporation, Plant B. Chairman: Alfred T. Rando, Tool Engineer, Lockheed Aircraft Corporation, Plant A.

"What Management Expects from Tool Engineers". Speaker: George A. Betts, Superintendent of Tool Engineering, Lockheed Aircraft Corporation, Plant B. Chairman: Dick R. Linch, Tool Engineer, Lockheed Aircraft Corporation, Plant B.

"Substitute Steels for War Products". Speaker: J. A. Berghard, Metallurgist, Columbia Steel Company. Chairman: F. R. Adler, Tool Engineer, Douglas Aircraft Company.

After the conclusion of the conference, it was said, the membership of western chapters voiced strong interest in the possibilities of an annual Pacific area conference and tool show. Already, San Francisco is bidding for such a meeting, to be held in September, 1945.



Gargantuan Grinder at Baldwin Locomotive

•Machine tool news often comes from plants using new equipment, not from machine tool builders.

Such was the case last month when The Baldwin Locomotive Works, Philadelphia, revealed a grinding machine that puts maximum precision into Diesel engine crankshafts. The new unit, largest of its kind in the United States, can handle crankshafts up to 216", and has a swing capacity of 40".

Baldwin's new grinder is driven by two motors, a 30 horsepower wheel drive motor, and a seven and one-half horsepower traverse drive motor. It will grind crankshafts for engines of from four to 12 cylinders.

Credit for building the spectacular unit goes to the Landis Tool Company, Waynesboro, Pennsylvania.

The machine is one of several specially designed for the new Baldwin shop, which will cover 300,000 square feet, more than twice the floor space now in use. Concentrating Diesel production under one roof, the shop is near completion.

HARTFORD TOOL ENGINEERS PUBLISH SALVAGE MANUAL

★ ★ ★

● HARTFORD—Publication of "The Hartford Manual", a 68-page book dealing with conservation and salvage of tools and gages, has been announced by the Hartford chapter of A.S.T.E.

Predicated on the premise that worn-out or broken tools and gages can be reclaimed for long useful life by simple economical methods, the manual sets forth these procedures, together with their limitations.

Included in this book is information on design for economy and utility, salvage by brazing and grinding, methods of increasing gage and tool life, and kinks and shortcuts.

Publication is by the Hartford chapter at its own expense. Copies are available from the National Office at Detroit at 75 cents each.

(Continued on page 128)

Precision that holds!

Two things are important in a gage—how accurate it is, and how long that accuracy can be depended upon.

Folks who depend upon PM Gages give them a double vote of confidence. Confidence in their precision, which is checked and double-checked, and then re-checked. And confidence in their smooth-ground, highly polished and extra hard finish—to put off the effects of wear.

Deliveries that click!

Standard plug, ring and thread gages, in the most useful sizes, are carried in stock—thousands and thousands of them—for immediate shipment.

Special gages of course we have to build to specification, and because demand varies, even the standard stock may be short on some items.

But usually, a letter or wire to DEPARTMENT EX will get a shipment on the way to you in a few hours.

Wire Department EX

The PIPE MACHINERY COMPANY Cleveland, O.

(Continued from page 126)

MOTOR MEMOS

Two-year war record outstanding. Production men lick re-tooling problems posed by cancellations.

DETROIT — Two years ago last month informal "funeral services" were held on passenger car assembly lines. After 40 years of uninterrupted production the industry ceased to turn out its own product.

Since February 10, 1942, auto builders have chalked up the most remarkable production record in the history of mass manufacture. Industry-wide figures, compiled by the Automotive Council for War Production, reveal a 24-month output of war materiel valued at $14,200,000,000.

Before the last car had reached the end of the assembly line, the machines, tools, and conveyers which had been used in the production of that car were being torn from their foundations. All-out conversion was under way in 1,038 of the industry's principal plants, now devoted 100 per cent to war work.

Far down the list of automotive war products two years ago, aircraft has since skyrocketed to number one position. Deliveries of planes, parts and engines have amounted to $5,030,000,000, or nearly half of the total output for the period.

Other auto-built war products: military vehicles and parts valued at $4,200,000,000; tank production worth $1,900,000,000; ordnance costing $1,150,000,000; ammunition, $500,000,000; and miscellaneous materials making up the balance of $400,000,000.

Just as it got top billing in the value of products classification, aircraft work in motor plants was the number one consumer of manpower. The industry's contribution to the nation's growing air might is reflected by the fact that 42.4 per cent of its workers have been engaged in such work.

Now, significantly, almost universally the industry has announced it has no interest in post-war plane manufacture.

● **Recognized for high production,** static model manufacture, auto production men have proved beyond a shadow of doubt an outstanding ability to accept over-night change in products and methods.

Proof of this fact are war contract and subcontract cancellations totaling $2,000,000,000 to date. Such setbacks, making deep inroads into worker morale, have called for leadership to get newly-allocated orders into production rapidly.

In switching to new products, the industry many times has been faced with physical problems comparable with those originally encountered in converting auto plants to weapons output.

Heart rending to any production man, for example, was the experience of one concern that spent 15 months in preparing a factory for production of a new tank, only to have the contract cancelled and a new product ordered — an 18-ton prime mover — just as the tank lines were beginning to roll.

In accomplishing the conversion, it was necessary to move and rearrange 1,154 government-owned machines. Eventually, 706 were converted to the prime mover job, while the remainder were shipped to other companies or moved into a corner of the factory.

Only 10 per cent of the tank's jigs and fixtures were usable for the new contract. Materials were shipped by carloads to other tank arsenals. Some were consigned to scrap.

Despite the need for numerous structural plant changes, three months later prime movers were rolling off the assembly line.

● **Trucks:** Numbed by the effect of the Army's mid-winter announcement of a whopping new truck order, automotive production men last month began to see clear skies again. Military vehicle output was trimmed back to allow the manufacture of an estimated additional 100,000 civilian units.

Crux of the situation lies in the additional work involved in heavy parts for big army trucks. For example, a cutback of one 6 x 6 military vehicle equals the addition of three axles for civilian units. Now that the business looks more desirable, interest centers in the WPB-Ordnance allocation of orders.

At this writing, the industry's order book for 1944 reads: 1,000,000 military and civilian trucks needed. Annual peacetime output averages 700,000.

X-RAY INSPECTION

● Ternstedt set-up checks up to 40 parts a minute

● High production is the backbone of the automobile industry. Consequently, motor manufacturers' thinking centers on "pieces per hour".

The most recently revealed example of the latter is a method of X-raying in mass quantity introduced by General Motors' Fisher Body Division in the inspection of high-stress parts for use in airplane manufacture.

Developed to enable high-speed inspection of strategic castings to keep pace with assembly line production, the new X-ray machine has a capacity of two pictures per minute or one completely inspected tray, containing from one to 20 parts, every 30 seconds.

The machine, developed jointly by the Ternstedt Division of Fisher Body and Westinghouse, involves simple assembly line principles. The most important unit in the process is a 40-foot long conveyer that carries castings before the X-ray equipment where "blow holes", cracks, and other defects in the metal are revealed.

In addition to speeding inspection, the method has reduced the number of man-and machine-hours normally wasted on imperfect castings as flaws are detected before machine operations are begun, Fisher engineers point out.

Although designed to inspect engine

(Concluded on page 130)

Mass quantity X-raying in Fisher Body's Ternstedt Manufacturing Division involving a 40-foot long conveyor that carries castings through inspection equipment.

Fisher Body photo

"...SHAVED AERO-GEARS can be made equal to or superior to Ground Gears..."

...as reported in "American Machinist"

Ford currently is finishing 27 P & W aircraft engine gears by "shaving", with the following results:

1. Time cut from 40 minutes to 5 minutes.
2. Eliminates "burnt" teeth.
3. No change in hardness required, but shaved gears are somewhat *harder* than ground gears.
4. Involute error ± 0.00015 inch.
5. Parallelism held within 0.0002 inch.
6. Tooth spacing error, max. 0.0001 to 0.0002 inches.
7. Face runout averaged 0.0005 to 0.0001 inches.

For the complete story, ask for a copy of "Gear Production Highlights", Vol. VIII No. 1

AT ANOTHER plant, this battery of 860-B machines, similar to those used by Ford, is shaving gears for water-cooled aircraft engines, too.

ORIGINATORS of GEAR SHAVING

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD • DETROIT 12, U. S. A.

BUY U.S. BONDS STAMPS

HYDRAULIC POWER Straightening PRESS

Model HP-010-P

10 TON CAPACITY YET SENSITIVE ENOUGH TO BEND SHAFT A MINIMUM OF .001"

Speed Up Your Checking and Straightening Jobs

The latest and most practical type of power press . . . sensitive, speedy, accurate. Developed to supplement the highly successful line of Anderson Hydraulic Hand Presses. With a capacity up to 10 tons it is so sensitive and so accurate that a shaft may be bent as little as a .001 of an inch.

The pressure gauge, indicating ram loading, is mounted near the work at eye level to facilitate quantity production. Beneath the ram, at the point of maximum deflection of the work piece, is located an adjustable dial indicator. This indicator clearly shows amount of shaft run-out in pre-loaded, fully loaded, and unloaded positions.

Use of the Hydraulic system on this press provides distinct advantages over conventional types.

A flexible, sensitive control of press is made possible by means of a unique rotary control valve. This valve is operated from the front of the machine by a control lever which, when depressed, causes a corresponding increase in the load applied to the work. An infinite range of loading up to capacity is obtainable as the lever is moved from 0 to maximum displacement. Push button control of the hydraulic unit is provided for starting and stopping, although no load can be applied to the ram until the lever is depressed.

The length of press work table is 60 inches. Available table attachments include checking rolls, spring loaded centers, adjustable anvils and indicator. To further aid production speed, an adjustable stop collar is provided which may be used to limit the 6" maximum stroke of the ram. Hand operated control equipment is standard but extra provision can be made for foot operation upon request.

ANDERSON BROS. MFG. CO.
Anderson
ROCKFORD, ILL. U.S.A.

Write for Bulletin 110

INDUSTRIAL NEWS DIGEST

(Concluded from page 128)

and fuselage castings of aluminum up to five inches thick, the machine can be adapted readily to use on other metals. Castings move along the conveyer in trays that halt automatically before the X-ray. A hood, lined with ¾" lead, drops over the tray protecting workers from X-radiation. For identification purposes, corresponding numbers are given the film and castings.

Due to the lead-lined hoods, the mechanism can be placed anywhere in the shop. Specially-built, lead-lined rooms, which must be evacuated during exposures, generally are used throughout the industry.

MAGNETIC INSPECTION

● Ford plants equipped to examine parts for bombers and engines

● Ford engineers are using an X-ray method known as magnetic particle inspection which reveals surface and sub-surface flaws. X-ray examinations are made of parts for bombers and Pratt & Whitney engines. Equipment is located throughout the plants.

Chief reason for the extensive use of magnetic particle inspection today is the fact that it is a non-destructive test. Still young in the industrial world, magnetic particle inspection requires highly trained personnel for its operation. To solve this manpower problem, according to J. F. Coultier, head of the metallurgy department of the Ford Aircraft School, the company instituted a course in magnetic inspection and prepared a text book on the subject.

By the end of 1943, more than 600 civilians had been trained in the school, in addition to armed force personnel and company service travelers.

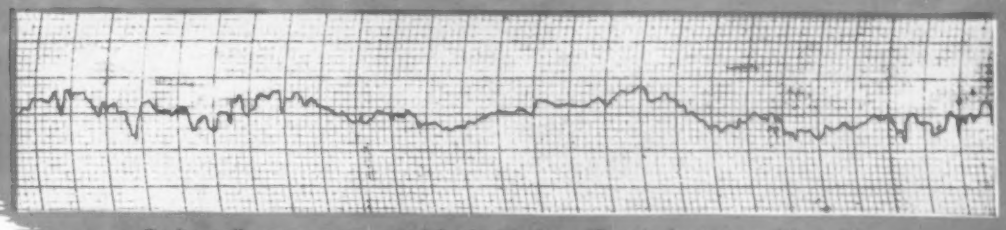
The theory of magnetic particle inspection is based on the fact that a piece of steel may be magnetized by passing through it or around it a current of electricity. This tends to magnetize more highly the areas where there are flaws. The indicating particles will be attracted and held at these highly magnetized areas, thus producing indications which must be correctly interpreted to derive full benefits from the inspection.

The continuous process type of magnetic particle inspection machine consists of two contact plates, or a coil, used to pass the electricity through and around the pieces to be tested, and a tank containing a mixture of oil and nonferrous particles.

A pump maintains a continuous flow of the mixture through a hose and nozzle, so that it may easily be directed on the piece being inspected. Flaws in the steel will disturb the magnetic field and will be indicated by an arrangement of the ferrous particles.

Frequently, it is impossible to determine if an indication is caused by a crack or impurity in the metal, or if it is merely the result of a strain in that area of the piece. If it is thought to be a strain area, the piece may then be subjected to a special heat treatment which removed the strain condition. If, however, the indications do not disappear, then there is some other cause.

Proof of a Better Finish



Each small square represents 1.0 micro inches. Micro inch r.m.s. = 0.9 — 1.8.

Surface Analyzer Tapes Show You Get A Better Finish With Chicago Wheels

These results were obtained at a rate of 10 pieces per hour in an aircraft parts plant. Material, X-13-15, Rockwell 60 to 57, grinds out .006 to .007 stock. Chicago Wheel used, ½ x ½ x ⅛", Grain 180, Grade L Arcite. Spindle Speed 40,000 r.p.m. Lapping and super finishing eliminated on this job.

Can you match that finish? Sounds phenomenal, but you can do the same thing with Chicago Wheels.

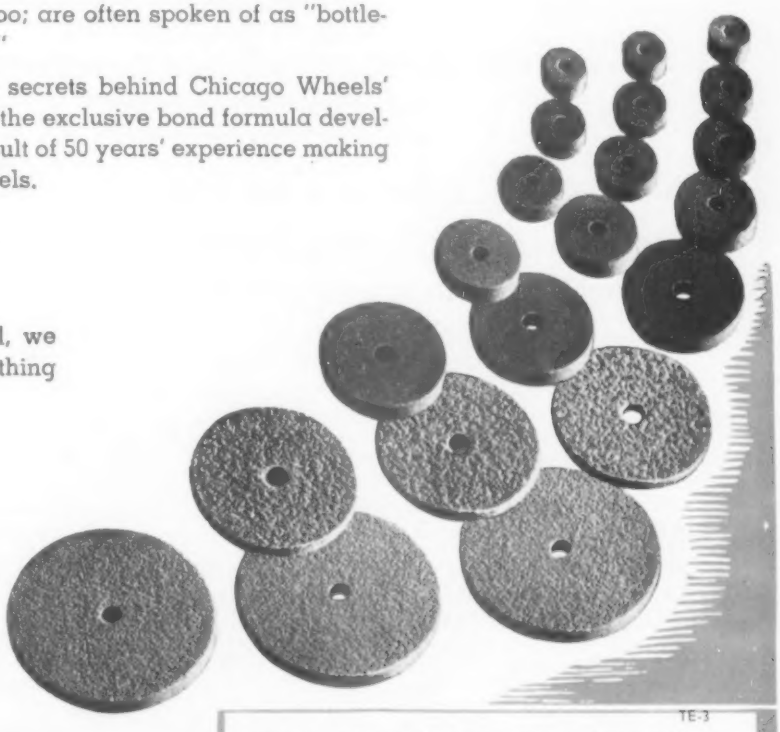
Squint your eye along the surface, test it by "feel" or be scientific and use a surface analyzer to measure your finish in micro inches — you'll find that Chicago Wheels give you better finishes, hold closer tolerances and have longer life. They're mighty fast, too; are often spoken of as "bottle-neck busters."

One of the secrets behind Chicago Wheels' superiority is the exclusive bond formula developed, as a result of 50 years' experience making grinding wheels.

Now Featuring Wheels Up to 3" in Diameter

For the duration, with full WPB approval, we are specializing on the small sizes — anything up to 3" in diameter.

Write for Catalog and we will include Engineering Survey Forms helpful in getting the right solution to your own grinding problems.



Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Industry.

MOUNTED WHEELS — SMALL GRINDING WHEELS

CHICAGO WHEEL & MFG. CO.

America's Headquarters for Mounted Wheels and Small Grinding Wheels

1101 W. Monroe St. Dept. TE Chicago 7, Ill.

TE-3

Send Catalog and Survey Forms. Interested in ( ) Mounted Wheels. ( ) Grinding Wheels.

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Address_____

★ ★ ★ ARMY - NAVY "E" AWARD WINNERS ★ ★ ★

AIR-MAZE CORPORATION
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THE BALDWIN LOCOMOTIVE WORKS
Whitcomb Locomotive Co.
Rochelle, Illinois

THE BRILL CORPORATION
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Detroit, Michigan

KEWANEE MACHINERY & CONVEYER COMPANY
Kewanee, Illinois

MANCO MANUFACTURING COMPANY
Bradley, Illinois

PRODUCTION FOR VICTORY

● Presentation of the Army-Navy burgee signifies attainment of all-out, victory-level production by the recipient. Today, that coveted pennant flies over some 2,400 plants.

● To win its "E" Awards, to attain current output, U.S. industry last year increased its steel capacity 15 per cent; boosted aluminum capacity sevenfold, magnesium production to 70 times the pre-Pearl Harbor level; tripled the preceding decade's total machine tool volume; expanded its aircraft plant equipment 40 times; launched ships at 80 times the prewar rate.

● The result: Last year's output was 100 per cent over 1939's.

● Decrying predictions that 1944 would witness sharp cuts in war production, WPB Chief Nelson recently pointed to industry's job this year—to boost war output 17 per cent.

THE MILL-ROSE COMPANY
Cleveland, Ohio

MIXING EQUIPMENT COMPANY, INC.
Rochester, New York

MOORE DROP FORGING COMPANY
Springfield, and Chicopee, Massachusetts

NATIONAL LEAD COMPANY
Magnesium Reduction Company
Luckey, Ohio

JOHN J. NESBITT, INCORPORATED
Philadelphia, Pennsylvania

NEW ENGLAND LIME COMPANY
Canaan Magnesium Plant
Canaan, Connecticut

NOBLITT-SPARKS INDUSTRIES, INC.
Columbus, Indiana

NORTHWESTERN CORPORATION
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THE OSBORN MANUFACTURING COMPANY
Cleveland, Ohio

PITTSBURGH PIPING & EQUIPMENT COMPANY
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SAGINAW STAMPING & TOOL COMPANY
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SYMINGTON-GOULD CORPORATION
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UNITED METAL BOX COMPANY, INC.
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UNITED STATES RUBBER COMPANY
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WILLARD STORAGE BATTERY COMPANY
Cleveland, Ohio

WINTER BROTHERS STAMPING COMPANY
Detroit, Michigan

YOUNGSTOWN SHEET & TUBE COMPANY
Chicago District Works
East Chicago, Indiana

HOW A BOWSER FILTER IN AN INDIANA PLANT *Tripled Tap Life and Paid for Itself in 30 Days...*

An Indiana war plant had a bottleneck . . . taps used on 20 mm. shells were wearing out too fast . . . steel particles in the cutting oil chewed them up.

Bowser Pressure Filters were installed. Complete elimination of the abrasive in the oil promptly tripled the life of the taps and cut to one-third the time and expense of changing and redressing.

That's only part of the story. Scrap shells, due to faulty tapping, were virtually eliminated. Rejections, due to undersized threads, were reduced 85 per cent.

And plant executives figured that the filters paid for themselves in less than thirty days.

Filters are only one of the many types of Bowser equipment that would likely make your plant operation more efficient, productive and economical. There are, for instance, Bowser meters, proportioners, lubrication units, pumps, stills, oil conditioners. *Wherever liquids are handled, there's a need for something that Bowser makes.* BOWSER, INC., Fort Wayne, Indiana.

BOWSER ESTABLISHED 1885

BUY WAR BONDS

LIQUID CONTROL SPECIALISTS SINCE 1885

No Jerk
No Jolt
No Jump

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

OILGEAR

An Oilgear Plus: Oilgear also enabled Neo Gravure to discover for the first time the correct pressure to use on their impression cylinders. Result: longer sustained quality, longer roller and cylinder life.

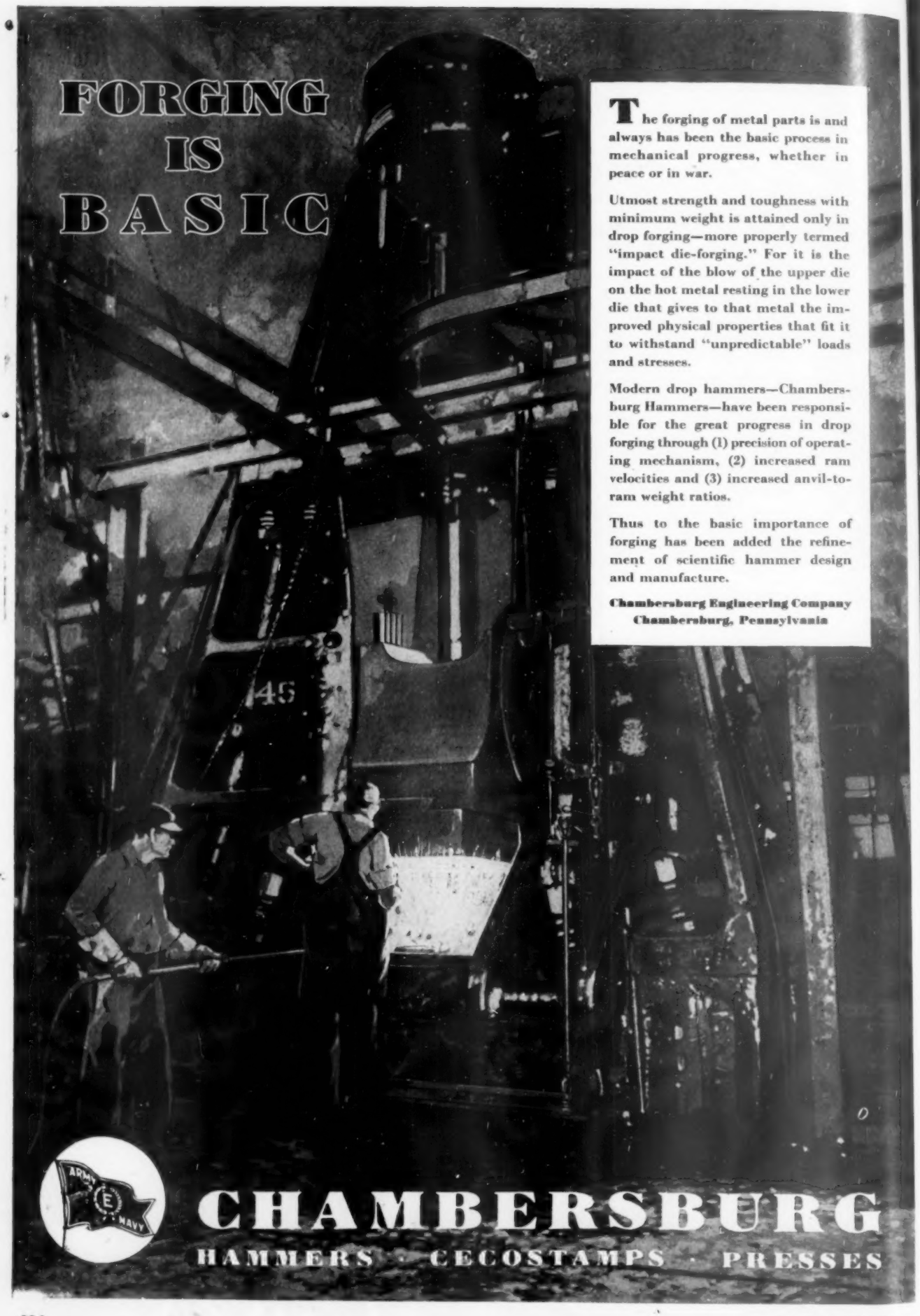
The Famed Oilgear *"Glide"* May Solve a Drive Problem for You

To print an entire magazine in 4 colors, on both sides of the paper, in one pass through a huge rotary press requires an unbelievable miracle of smoothness and synchronization. But the Neo Gravure Printing Company of New York and Chicago weren't getting the miracle. They got spoilage, waste and delay instead. So they turned, as many another company or machine designer in trouble has turned, to Oilgear Fluid Power. That was in 1934, then 1936, then 1937 and 1939. For they found that Oilgear accelerated their presses as "smooth as silk" from zero speed to maximum . . . synchronized all press units in lock-step . . . gave a new precision control, hundreds of feet more floor space, and a performance which became a new standard for the industry.

The famed Oilgear stepless acceleration is just one of the dozens of remarkable functions this remarkable system can bring to your machine design problem. Maybe you want tremendous power in small space . . . power around corners where belts and gears can't reach . . . a combination of rotary and linear motion. Maybe you need something you haven't thought of. Why don't you consult Oilgear engineers' broad experience and see what Oilgear versatility can do. Now is the time to write. . . . THE OILGEAR COMPANY, 1308 West Bruce Street, Milwaukee 4, Wisconsin.

OILGEAR

Fluid Power



The forging of metal parts is and always has been the basic process in mechanical progress, whether in peace or in war.

Utmost strength and toughness with minimum weight is attained only in drop forging—more properly termed "impact die-forging." For it is the impact of the blow of the upper die on the hot metal resting in the lower die that gives to that metal the improved physical properties that fit it to withstand "unpredictable" loads and stresses.

Modern drop hammers—Chambersburg Hammers—have been responsible for the great progress in drop forging through (1) precision of operating mechanism, (2) increased ram velocities and (3) increased anvil-to-ram weight ratios.

Thus to the basic importance of forging has been added the refinement of scientific hammer design and manufacture.

Chambersburg Engineering Company
Chambersburg, Pennsylvania

40,000 Hours SAVED on RED RING Shaving Machines

40 [illegible] 30 Manhours Saved

A saving of 40,000 manhours a year in the production of engines for Flying Fortresses is announced by the Studebaker Corp. The economy resulted from use of shaving machines in place of grinders on a fifteen-tooth pinion gear, which is carried in sets of 20 on each Wright-designed fortress engine, such as Studebaker builds. Scrap has been all but eliminated, and one man now produces as many units as five men using grinders, according to George W. Bunner, general manager of Studebaker's aircraft engine parts plant at Fort Wayne, Ind.

NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

3600 ST. JEAN • DETROIT 13, MICH.

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

HOW 3 SUNDSTRAND SPECIAL PROCESS MILLING MACHINES

1 *replaced 18 special milling machines*

2 *saved $249.984.00 per year...in addition to increasing tool life*

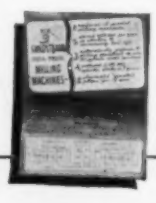
3 *automatically mills 16 surfaces each machine cycle*

4 *produced 8.750.000 cylinder blocks in 7 years*

5 *eliminated "operator's fatigue" for 18 men*

FREE ADDITIONAL DATA . . .

is included in this folder. Additional features are stressed. For instance, 3,500 cylinder cases per grind with a 25" feed per minute, taking a 3/8" depth of stock is another accomplishment of this machine. Write for this information today. It may prove valuable information in planning present or postwar production. Ask for Bulletin No. 822.



SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS U.S.A.

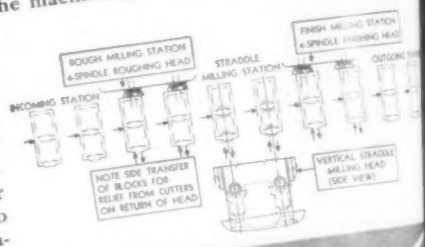
ARMY NAVY

The Problem . . .

consists of rough and finish milling the front end and straddle milling the rear and intermediate bearing faces. The equipment used previously occupied considerable floor space and was so designed that the cylinder blocks had to be lifted from a conveyor line to the machine, a tedious and extremely tiring operation.

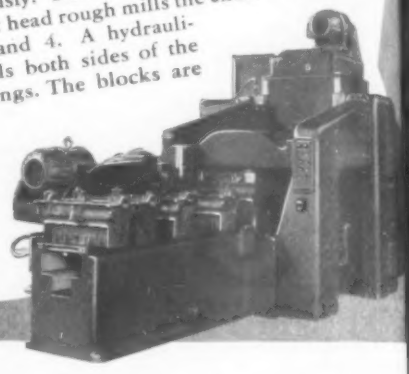
The Solution . . .

Sundstrand Engineers designed this machine to incorporate all of the operations in each of the 3 machines. This makes it possible for the operator to control the machining from a push button station. The sketch illustrates the sequence of operations and flow of blocks through the machines. Note the ingenious method of incorporating vertical milling together with the transfer sidewise, so cutters do not return over machined surfaces.


ROUGH MILLING STATION
4-SPINDLE ROUGHING HEAD
STRADDLE MILLING STATION
FINISH MILLING STATION
4-SPINDLE FINISHING HEAD
INCOMING STATION
NOTE SIDE TRANSFER OF BLOCKS FOR RELIEF FROM CUTTERS ON RETURN OF HEAD
VERTICAL STRADDLE MILLING HEAD (SIDE VIEW)

The Machine . . .

mills six blocks simultaneously. Two blocks automatically move into stations 1 and 2. The left head rough mills the ends. The blocks then move into stations 3 and 4. A hydraulically fed head straddle mills both sides of the intermediate and end bearings. The blocks are shuttled into stations 5 and 6. The right head finish mills the ends. The blocks are unclamped, clamped and moved automatically between each operation.



● Designed and built in 1936 these special process milling machines have established an outstanding performance record. Prior to their installation, 12 conventional special high production rotary face milling machines and 6 special vertical straddle milling machines were used. Three Sundstrand special process Rigidmils do the same amount of work at a saving of 15 machines. In addition to these savings, there is a considerable amount saved in electrical power, floor space and maintenance. Also, the previous trouble of getting the bearing faces square with the front end face of the cylinder block has been entirely eliminated.

SUNDSTRAND MACHINE TOOL CO.

Rigidmils • Fluid-Screw Rigidmils • Automatic Lathes • Hydraulic Equipment • Drilling and Centering Machines • Special Milling and Turning Machines

2532 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.

Proof of Increased Tool Life Through this New Cold Treating Process

High Speed Drill Life Increased from 48 to 256 Holes per Grind by Sub-Zero Treating

Many well known manufacturers today are obtaining remarkable increases in tool life by cold treating high speed cutting tools in Deepfreeze Industrial Chilling Equipment. Tests reveal that subjecting high speed tools to temperatures of −120° F. in a Deepfreeze Cascade Industrial Chilling Machine for a period of from two to three hours causes a decomposition of any retained austenite to martensite. This transformation results in a greater uniformity of hardness and often increases the hardness. In either case the results obtained invariably show an increase in the life of the cutting edges.

Among the many cold treating tests conducted by a large and prominent machine tool manufacturer is the treating of high speed drills used to drill four $1\frac{1}{32}$" diameter holes in a yoke lever part made from S.A.E. 4340 steel forging with the Brinell of 387. Using a special two-spindle opposed head machine, this operation is performed at spindle speeds of 450 r.p.m. with a feed of 5" per minute.

Before cold treating in a Deepfreeze, the best possible performance of these drills was 48 holes per grind. Now, after treating for two hours at −120° F. in a Deepfreeze Industrial Machine, the average results are 256 holes per grind, or an increase of over 500%.

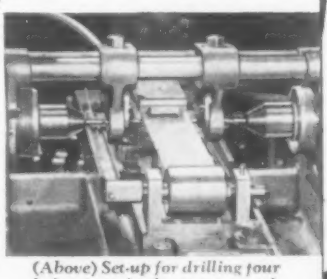
This is but one of the many outstanding results obtained by the cold treating of tools in this plant. On a gang milling operation on another yoke lever, cutters were formerly changed every 7 hours for grinding, while now after cold treatment these cutters will run 24 hours before grinding is necessary.

Pieces of tool steel from old and broken milling cutters are salvaged and reclaimed into bits which are welded to a slotting tool for cutting a guide slot $\frac{3}{4}$" x $\frac{3}{4}$" x 30". Previously, the best possible results were 25 to 52 slots per grind with carbide tipped tools. After cold treating these reclaimed bits for two hours at −120° F. in the Deepfreeze machine, an average of 119 slots per grind was obtained.

"We Cold Treat All Tools Now Before Using"

This manufacturer now requires that every cutting tool that comes into the plant be cold treated before it is used, and also that all cutters be cold treated after sharpening to restore original hardness of the actual cutting edges that may be slightly softened during resharpening operations. Every user of cutting tools can obtain similar increases in tool life by cold treating. If you do not now have a Deepfreeze machine in your own plant, insist upon cold treated tools from your tool supplier. Experience in this and other plants has shown that cold treating even results in increased tool life with new cutters.

Find Out How You Can Use Deepfreeze Chilling Machines in Your Plant... For the complete and latest data on the use of cold treatment of metals in industry today, get this new Deepfreeze Metal Chilling Booklet. It contains complete details, specifications and lists other applications of Deepfreeze Chilling equipment. Write for your free copy today.



(Above) Set-up for drilling four holes in yoke lever part with cold treated tools.

(Above) A few cold treated tools and machine parts are shown on table of Deepfreeze Cascade −120° F. Industrial Chilling Machine.

Read What One Manufacturer* Says About Cold Treating of Cutting Tools

After experiencing this increased hardness on Deepfreeze frozen parts, we conceived the idea of Deepfreezing high speed tools, drills, reamers, and cutters of various sizes and types. We found that on one particular drilling job, where we were using high speed drills and obtaining from five to seven pieces per grind, after applying drills that were deep froze at 120 degrees below zero for two hours, we now obtain from thirty to thirty-six pieces per grind. On one of these continuous milling operations on this same steel job we formerly obtained ten to twelve pieces per cutter grind, and after applying cutters that were given the Deepfreeze treatment we now receive thirty-eight to fourty-four pieces per cutter grind.

We also find that the number of pieces obtained after resharpening of the tools remains quite uniform which indicates that this Deepfreeze treatment penetrates into the interior of the tool and does not merely create a surface hardness.

*Manufacturer's name upon request.

Deepfreeze

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE

Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

2311 DAVIS STREET
NORTH CHICAGO, ILLINOIS

Division of Motor Products Corporation, Detroit, Michigan

YOU DON'T NEED SKILLED OPERATORS to do fast, accurate tapping *with*

Ettco-Emrick TAPPING ATTACHMENTS

With only brief instruction, inexperienced men or women can turn out accurately tapped holes at a fast rate with these Attachments, right on your drill presses. Here are the features that make this possible.

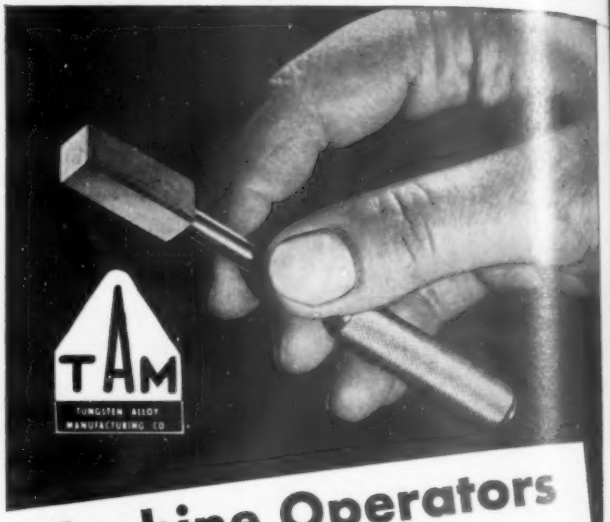
1. The exclusive Ettco-Emrick friction clutch which provides the delicate sensitivity needed in tapping, particularly with the smaller size taps. It's as sensitive as a hair trigger.
2. Reverse is automatic.
3. Tap idles in the cutting direction, which prevents hole chamfering and preserves cutting edges.
4. All parts are designed and built for high-speed operation.
5. QUILL CLAMPS are available for mounting on any drill press with absolute rigidity, assuring accuracy.

ETTCO-EMRICK TAP CHUCKS
Grip is visible, assuring proper insertion of taps every time. 5 sizes, for No. 0 to 1" taps. Details in Bulletin No. 6. Collet type chucks available for No. 6 to ¾" taps.

SEND FOR BULLETIN No. 2
IT GIVES FULL DETAILS
Copy mailed to you on request

ETTCO TOOL CO.
586 Johnson Ave., Brooklyn 6, N. Y.
Detroit · Chicago

The Famous Ettco-Emrick **DRILL CHUCKS • TAP HOLDING CHUCKS**
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship



Machine Operators are Demanding *Long Lasting* TAMALOY DIAMOND HONES

NO wonder there's such a large demand for these handy, pocket-size hones! Operators are finding that tools last longer, need less regrinding, retain their original cutting accuracy—with just a light touching-up from time to time with a Tamaloy Hone. And the hone's convenient shape and size permit working in close quarters, saving time and often eliminating the necessity of removing the tool from holder for honing.

Tamaloy Hones stand up, too, frequently giving as much as fifty times an ordinary hone's length of service. For the diamonds are bonded in tungsten carbide — not plastic — and don't work loose or fall out. Nor does the bonding tend to crumble or wear away. Three grades—100, 150 and 200 grit.

Write for full information.

FLASH!
Due to the great demand for Tamaloy Diamond Hones and the resulting manufacturing economies, a reduction in price has been made possible. Now $12, formerly $15 each.

TUNGSTEN ALLOY MFG. CO.
65 COLDEN STREET, NEWARK 4, N. J.

Tooth Section of Van Normanized Gear

Material	plain carbon steel
Hardened to	55-57 Rockwell C
Depth hardened	.035—.045
Heating time	15 Sec.
Quenching	8 Sec.

Total time for heating operation 23 Sec.

Gear Teeth Surface Hardened in 23 Seconds

with Van Norman Induction Heating

Previously, carburizing required hours to harden, draw, clean and lap the gear illustrated above. Now Van Norman Induction Heating hardens the teeth of the same gear to 55-57 Rockwell C in just 23 seconds. Warping and distortion are eliminated and no cleaning operations are necessary. Furthermore, since the operating cycle is entirely automatic, gear after gear is turned out with *identical* characteristics.

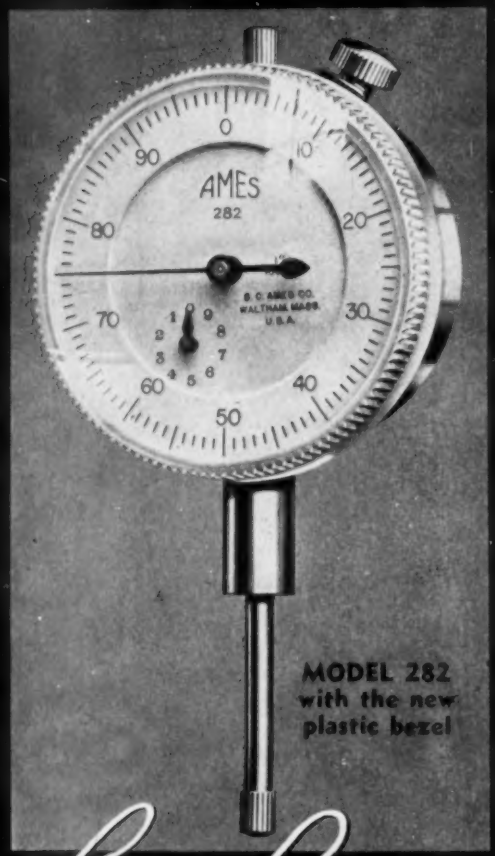
Obviously, *Van Normanizing* saves valuable work-hours, cuts costs and provides a hardened gear with superior performance qualities. Investigate the possibilities of Van Norman Induction Heating Units. Write for Bulletin M15.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

IT PAYS TO VAN NORMANIZE

AMEs



MODEL 282 with the new plastic bezel

Long Range
DIAL INDICATORS

For greater range when testing long tapers and in extensometer work, Ames Indicators having spindle travels up to one inch are commonly used.

The Plastic Bezel eliminates shadows and relieves eye strain. A new feature exclusive with AMES.

Send for catalog.

B. C. AMES CO.
WALTHAM, MASS., U. S. A.

BOYAR - SCHULTZ PROFILE GRINDER

MODEL
No. 1

Provides Short-Cuts In Tool and Die Work and In Production

Designed to save tedious hours of hand labor in tool and die work, Boyar-Schultz Profile Grinder No. 1 had proved its value. Now, this Grinder is providing short-cuts in production where difficult, irregular profiles and contours must be quickly and accurately ground.

Its high speed, approximately 20,000 R.P.M. permits rapid stock removal, even with wheels of small diameter.

Now available with the new square table with serrated top, size 10" x 10". Table is larger and serrations free the surface of grindings making smoother movement and working to closer tolerances possible.

BOYAR-SCHULTZ CORPORATION
2116 Walnut Street — CHICAGO 12, ILLINOIS

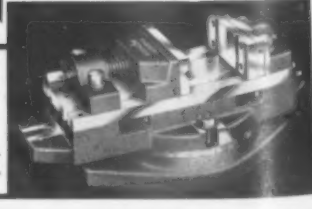
Producto Machine Vises

Everything in Machine Vises—from small 3" Drill Press Vise to 9" Heavy Milling Machine Vise including hardened and ground Precision Tool Room and Jig Borer Vises, Plain, Swivel and Angle Vises in various sizes,—Quick-Acting Cam Lock Vises for production purposes.

All are of modern design and made for rugged wear and accuracy.

Ask for Producto bulletins on Modern Machine Vises and Shop Tools.

Manufacturers of Producto Die Sets and Die Makers Accessories.



THE
PRODUCTO
MACHINE COMPANY
990 ROSSATORIC AVE., BRIDGEPORT, CONN.
3017 MERRURY — DETROIT, MICH.

S MONTH'S "BEST SELLER" ON THE PRODUCTION LINE

Acme-Gridley

BULLETIN NO CM-43

MODEL RPA
4-6 AND 8 SPINDLE

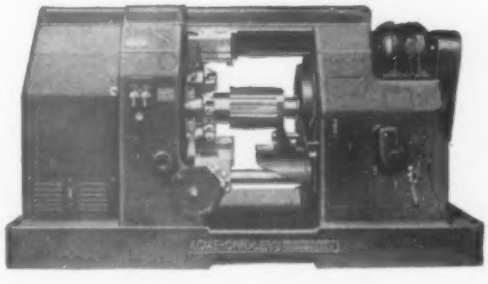
CHUCKING MACHINES

NEW BOOK
about a
ew Production Machine

duction men who have chucking work
do can't afford to be without this
ok—write for Bulletin CM-43, on
your letterhead.

★

New Acme-Gridley Chuckers—4, 6 and 8-spindle—are engineered for new production and accuracy—to produce more at lower costs.



THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

SUPER-CUT
DIAMOND WHEEL

GRINDS 22,000 BITS in Gruelling Endurance Test!

IN the hands of experienced operators, functioning under supervised conditions, a Super-Cut Diamond Wheel actually ground 22,000 carbide steel bits ***without wearing out!***

Of course, it is not to be supposed that **every** Super-Cut Diamond Wheel will establish such an outstanding record. Yet it is true that users are reporting ten, fifteen and twenty thousand bits ground on one and the same Super-Cut wheel.

Only Industrial Abrasives, Inc. can use the secret process of bonding that makes Super-Cut Diamond Wheels so tough, so clean-cutting, so long-lasting! That's why Super-Cuts wear so slowly and evenly, why they don't glaze over, why they are always sharp, with "fresh" diamonds ever at the grinding surface as others slowly wear away!

You, too, will be able to cut grinding costs materially by joining the Big Swing to Super-Cut Diamond Wheels! Ask for particulars now and take advantage of facilities permitting immediate deliveries.

Industrial Abrasives
INC.

3724 W. 38th Street, Dept. 3-B, Chicago 32, Illinois

STA-KOOL
TOOL HOLDER

What makes a really fine tool? Proper design and construction, of course, as well as quality of material and workmanship, plus the maker's integrity. JKS Diamond Tools are designed to meet all production problems, but it frequently happens that special conditions call for special treatment. In such cases we make a study of these conditions, preparing a JKS Diamond Tool that will stand up to the most exacting tests. You may add our experience and facilities to your organization by telephoning our nearest district office. This will bring prompt response and wholehearted coöperation.

J. K. SMIT & SONS

157 Chambers St., New York, N. Y. 6400 Tireman Ave., Detroit, Mich.

Broaching

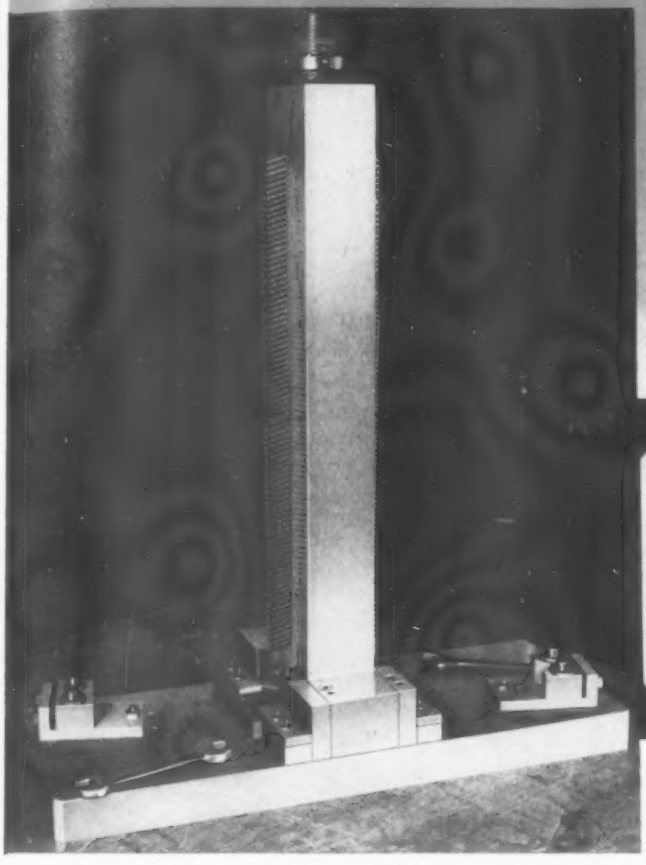
ON SHORT OR LONG RUNS

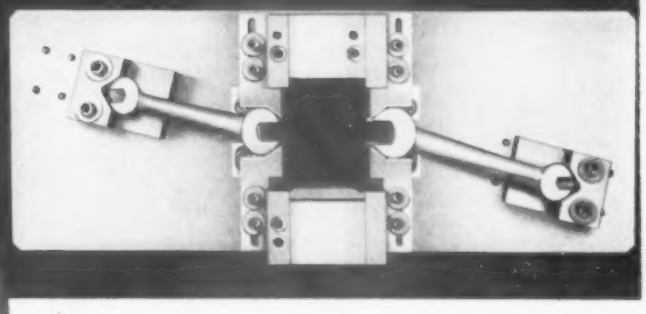
with

★ Inexpensive tools

★ Simple fixtures

★ Use of existing equipment





The photographs above show a Detroit Broach set-up for broaching the jaws of open end wrenches on a hydraulic press. No clamping is required and the locating blocks are adjustable to accommodate different wrenches. Broach inserts for different jaw sizes are easily interchangeable.

Although broaching was developed as a high production operation it can, through proper application, be used on small runs. Many jobs require only the simplest of tools and fixtures, such as those shown above. The work can be done on a simple hydraulic press such as is found in nearly every shop. Where different parts require similar operations it is often possible to provide the fixture with interchangeable pads so that several parts may be broached in the same general set-up.

There is a place for broaching in every shop. If you are looking for more speed, better finish, greater accuracy . . . and lower production costs . . . call on Detroit Broach Company. We will supply you with complete production and cost data without obligation.

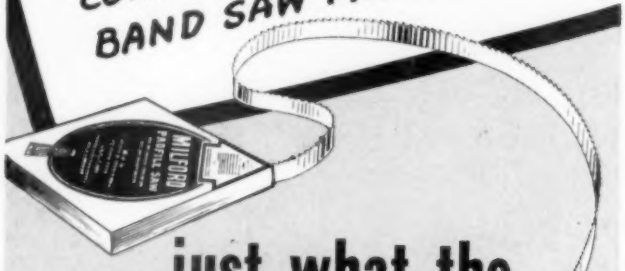
ARMY E NAVY

DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE • DETROIT, MICHIGAN

9308 SANTA MONICA BLVD. • BEVERLY HILLS, CALIFORNIA

℞ MILFORD PROFILE SAW PROPERLY PRESCRIBED FOR CONTOUR AND PROFILE BAND SAW MACHINES



...just what the Doctor ordered

When you use MILFORD PROFILE SAW you are using the product of specialists . . . the largest, most experienced group of metal saw specialists in the field, devoted to just one thing . . . band and hacksaw blades.

Their "know-how" . . . their special knack . . . is only gained from long years of accumulated experience. And they are still continually striving to improve what they make. Their knowledge and advice are at your service for the asking.

A LEADING AIRCRAFT manufacturer, with their cutting-off machines just coming into production, wrote us for recommendations for cutting specific metals . . . what saw . . . what speed . . . which machine. No chart supplied the answer. Our engineers went through that plant and developed complete cutting data . . . a special prescription for that particular case. And it did the job . . . 100%.

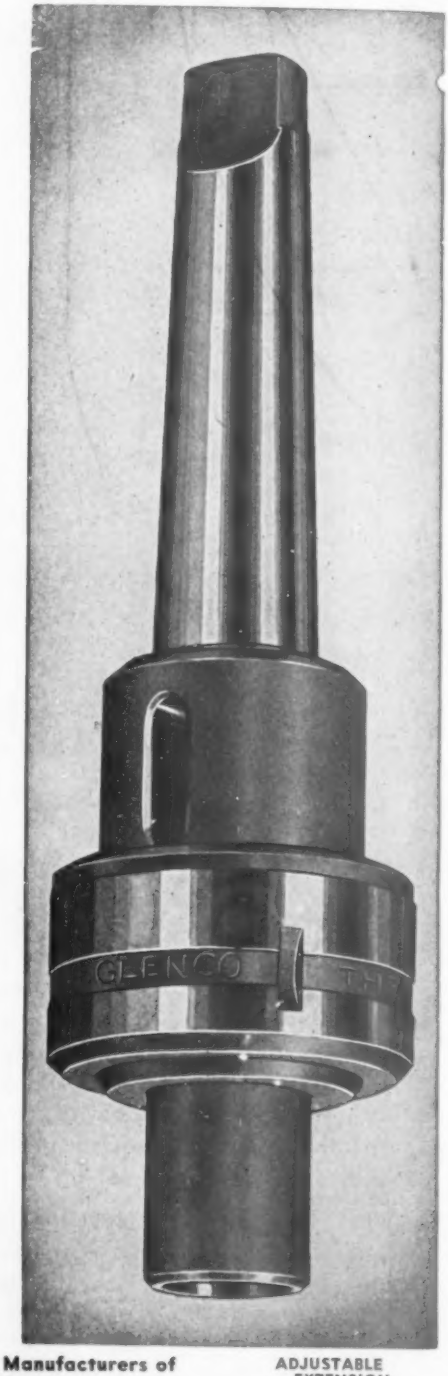
ORDER FROM YOUR MILL SUPPLY DISTRIBUTOR

MILFORD PROFILE SAW is now packed in an improved, stronger box . . . craft-lined, reinforced with wood from which the saw can be stripped free. No binding . . . no split corners . . . no buckling.

THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively for Over 65 Years
NEW HAVEN, CONNECTICUT, U. S. A.

GLENCO
FLOATING TOOLHOLDER

Corrects Machine Tool Misalignment By Producing TRUE and ACCURATE Holes



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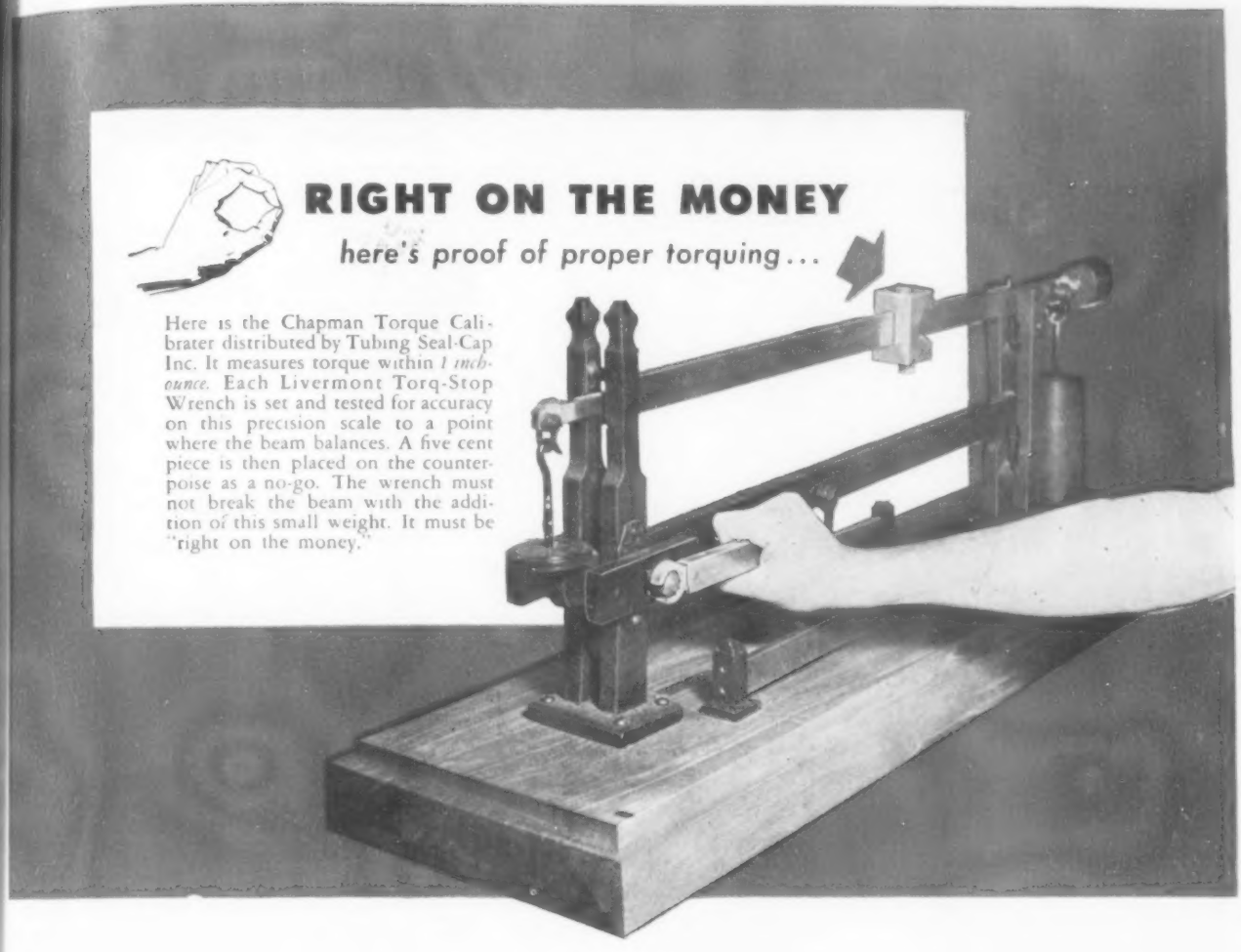
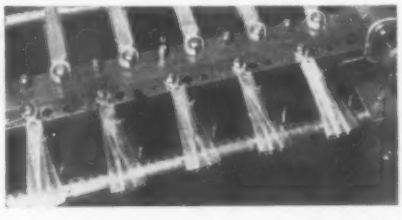

RIGHT ON THE MONEY
here's proof of proper torquing...
Here is the Chapman Torque Calibrater distributed by Tubing Seal-Cap Inc. It measures torque within *1 inch-ounce*. Each Livermont Torq-Stop Wrench is set and tested for accuracy on this precision scale to a point where the beam balances. A five cent piece is then placed on the counterpoise as a no-go. The wrench must not break the beam with the addition of this small weight. It must be "right on the money."

TORQUING "RIGHT ON THE MONEY"

with the world's easiest-to-use torque wrench—a recommended S.A.E. standard

Now nuts, bolts, clamps and fittings can be tightened to their safe, proper torque "right on the money" by unskilled help.

The accurate, sturdy, compact Livermont Torq-Stop Wrench is a production line tool that increases output, assures correct torquing (within 2% plus or minus). No dials, no batteries—nothing to watch. It gives an audible "click" and a definite physical sensation is transferred to operator's palm when proper torque is reached. Used by most aircraft companies and hundreds of production plants. Society of Automotive Engineers' recommended dimensions.



Tools Are Weapons—Treat 'Em Right.

10,000 OPERATIONS BEFORE FINAL APPROVAL. This is the Livermont Torq-Stop Wrench Break-In Table. Each Wrench after being set to its proper torque is operated through 10,000 consecutive cycles. When the 10,000 operations are complete the Wrench is removed and tested. It must not have varied over 2 inch-pounds during this test. It is then sealed at its proper predetermined torque for the job for which it was ordered.

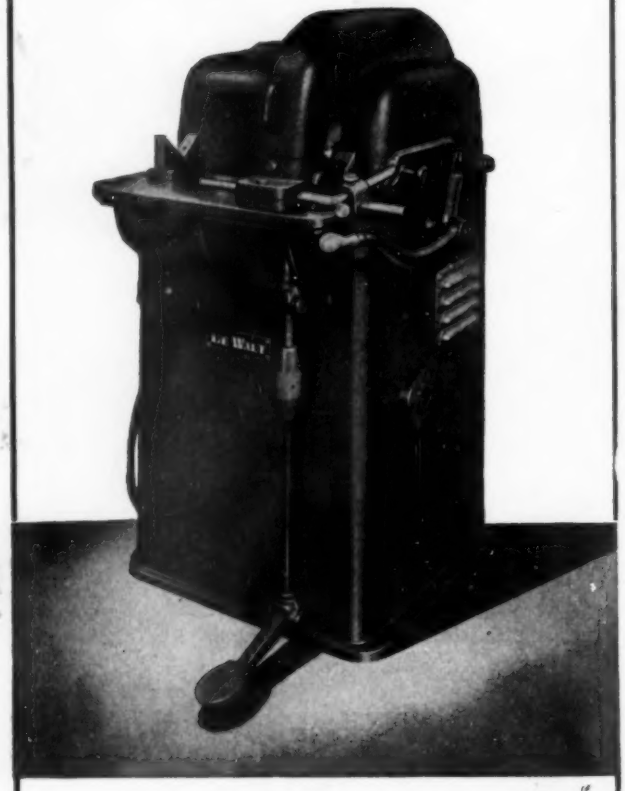
Send today for 36 page illustrated Aircraft Tubing Manual.

LIVERMONT *torq-stop* WRENCH

Sold by TUBING SEAL-CAP INCORPORATED

DeWALT

METAL CUTTING MACHINES



This compact, sturdily constructed High Speed Cutting Machine for light metals (Model ME-1), will cut ferrous and non-ferrous bar stock up to 1½"; light wall steel tubing up to 4" (Heavier wall tubing in non-ferrous); flat bar stock up to 1" x 4" (ferrous and non-ferrous); and extruded or small structural shapes up to 4" on a side. Other DeWalts are:

Foundry Metal Cutting Machine
Tube Cutting Machine
Wet and Dry Cutting Machine (ME-2)
Heavy Duty Wet Cutting Machine (ME-3)
Dual Column Metal Cutting Machine

DeWalt Builds a Complete Line of Metal Cutting Machines.

Write for descriptive literature

DeWALT PRODUCTS CORPORATION
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The new illuminated magnifier will aid in solving your inspection problems. Used for inspection and examining work for burrs, flaws in workmanship, surface defects, cracks in castings, blow holes, imperfect welding seams. Light shines on work, no reflection in eyes of operator. SPEED-UP INSPECTION WITH MAGNI-RAY.
INVESTIGATE! Wherever you now use ordinary magnifiers, try the ILLUMINATED MAGNI-RAY, and compare results. Write today for folder describing both models.
MADE IN 2 MODELS
Model 'A' with 3" lens complete with stand $18.50
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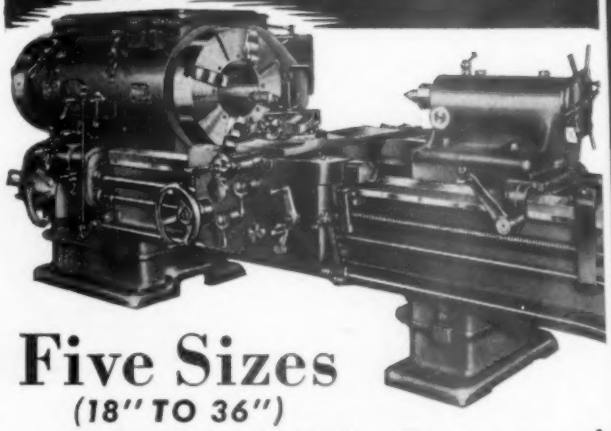
HYDRATROL LATHES

Large Hollow Spindle Type



Five Sizes

(18" TO 36")

Provide Wide Range of Usefulness and Efficiency!

Lehmann MACHINE CO.

CHOUTEAU AT GRAND • ST. LOUIS 3

LONGER LASTING LATHE CENTERS

ARE MADE FROM GRAPH-TUNG STEEL

LATHE CENTERS used to produce Gauge-Matic Discs must be able to take a lot of punishment and remain accurate. In addition to severe wear, further strain is imposed on the centers by the shock of the grinding wheel on the radii of the gauge.

Lathe centers of High Speed Steel lasted about a week on this job. Centers made of Graph-Tung Steel remained accurate and true and gave excellent performance 24 hours a day, seven days a week for 3 weeks! A total of 504 hours of uninterrupted, accurate, wear-resisting, service. A marvelous record, but typical of the job Graph-Tung Steel is doing wherever it is used.

Graph-Tung, a water hardening steel, has given excellent results when used for tools, dies, brake drums, cylinder liners, pump tubing, bushings, etc.

Today Graph-Tung and other Graphitic Steels, Graph-Mo, Graph-Sil, Graph-Al, Graph-M.N.S., are helping to hasten an early peace. Tomorrow they will be ready to speed production of your new products. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN GRAPHITIC STEELS

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The Timken Roller Bearing Company
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or from stock of the following distributors:

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A. Milne & Company
New York 14, Boston 9, Chicago 7

The Peninsular Steel Company
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Pacific Machinery & Tool Steel Co.
Portland 14, Oregon

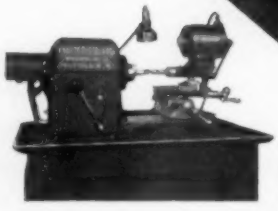
Seattle Steel Company
Seattle 4, Wash.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
GRAPHITIC STEELS

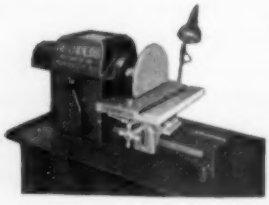
HERE'S COLLET HEAD *Versatility!*

REYNOLDS MODEL "C"

Showing — Reynolds Model C on cabinet base with slide rest attached.



Showing Model C with Dumore Grinder attached.



Showing Model C with sanding disc attached.

The new Model C is adaptable for polishing, finishing, filing, reaming, burring, sanding and many other machining operations.

Investigate the Reynolds Model C Collet Head Lathe Unit . . . it may be the answer to many of your production problems.

Write for Bulletin A.

REYNOLDS MACHINERY CO.

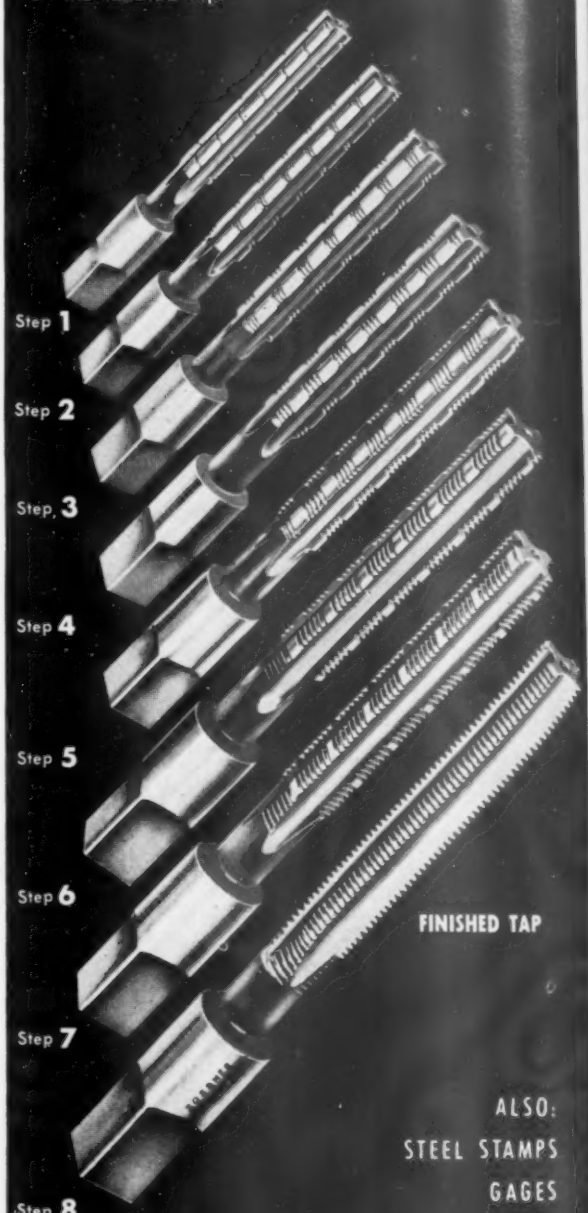
211 EDDY STREET, PROVIDENCE, R. I.

STAGES IN THE GRINDING OF A SOSSNER

OCTUPLE THREAD TAP

(8 STARTS)

A tap that calls for the highest degree of tap-making skill. Each start must be precisely indexed and then precision ground for perfect size, lead and thread spacing on the finished tap.



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STEEL STAMPS
GAGES
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SOSSNER

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GEROTOR

COLD BOILER STARTING PUMP

A dependable means of providing for emergency operation of marine oil burners. May be connected through by-pass piping to fuel oil line or to a separate supply of lighter fuel oil. Meets U.S. Navy requirements for naval and conversion vessels. Production inquiries invited.

GEROTOR PUMP DIVISION
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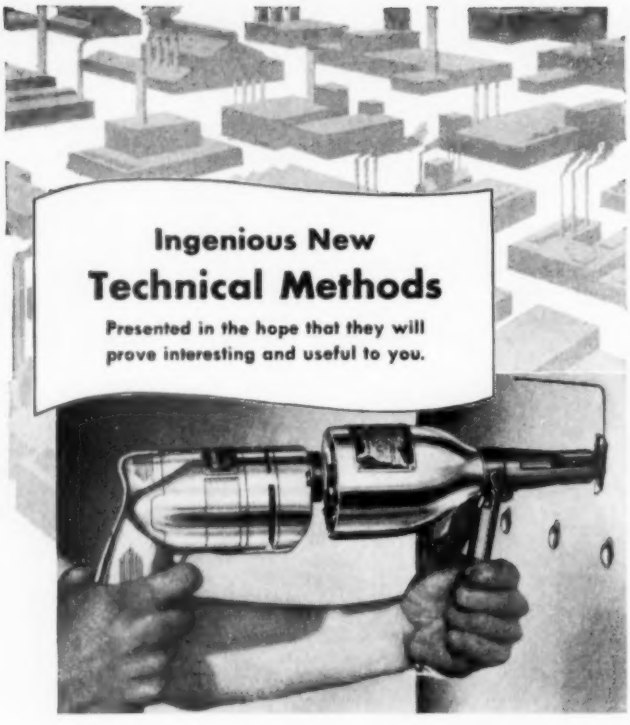
Pump Characteristics		Oil Viscosity 700 SSF to 5000 SSF	Oil Viscosity 5000 SSF to 10000 SSF	Oil Viscosity 35-55 SSU Diesel Oil
CAPACITY	G.P.M.	1.5	1.0	1.0
DISCHARGE	P.S.I.	350	350	100
SUCTION LIFT	IN.HG.	19.5	19.5	12
CRANK SPEED	RPM	60	60	60
PUMP SPEED	RPM	267	267	267
INPUT POWER	BHP	.95	.95	.55

PUMP CAPABLE OF WITHSTANDING STATIC PRESSURE OF 750 P.S.I.



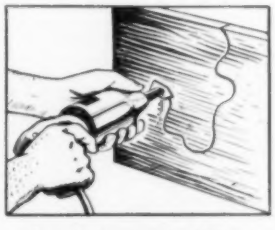
New Saw-Gun Saws and Files in Hard-to-Get-At Places

Jobs of sawing and cutting that are inaccessible to ordinary tools, are now made possible with the recently developed Saw-Gun. It works equally well on wood, plastics, light and heavy gauge metals (corrugated or plain—stainless and monel), castings, rods and other materials. The Saw-Gun saves hours on panel notching and slotting operations, doing work ordinarily requiring the use of several tools.

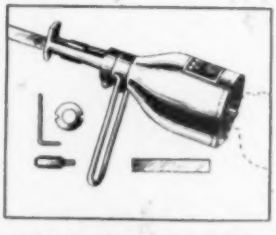
It is propelled by electric power, compressed air or flexible shaft and provides an efficient portable power-saw or file, that can be carried from place to place.

The Saw-Gun is operated by placing cutting edge of saw blade against work and turning on power. Filing is accomplished in the same manner by inserting a file in the tool instead of a saw blade.

We hope this has proved interesting and useful to you, just as Wrigley's Spearmint Gum is proving useful to millions of people (much to their surprise) working everywhere for Victory.



Permits sawing and filing in spots inaccessible to ordinary tools.



Can be directly connected to electric drill, air drill, or flexible shaft.

You can get complete information from the Mid-States Equipment Company, 2429 S. Michigan Ave., Chicago 16, Ill.

Y-106

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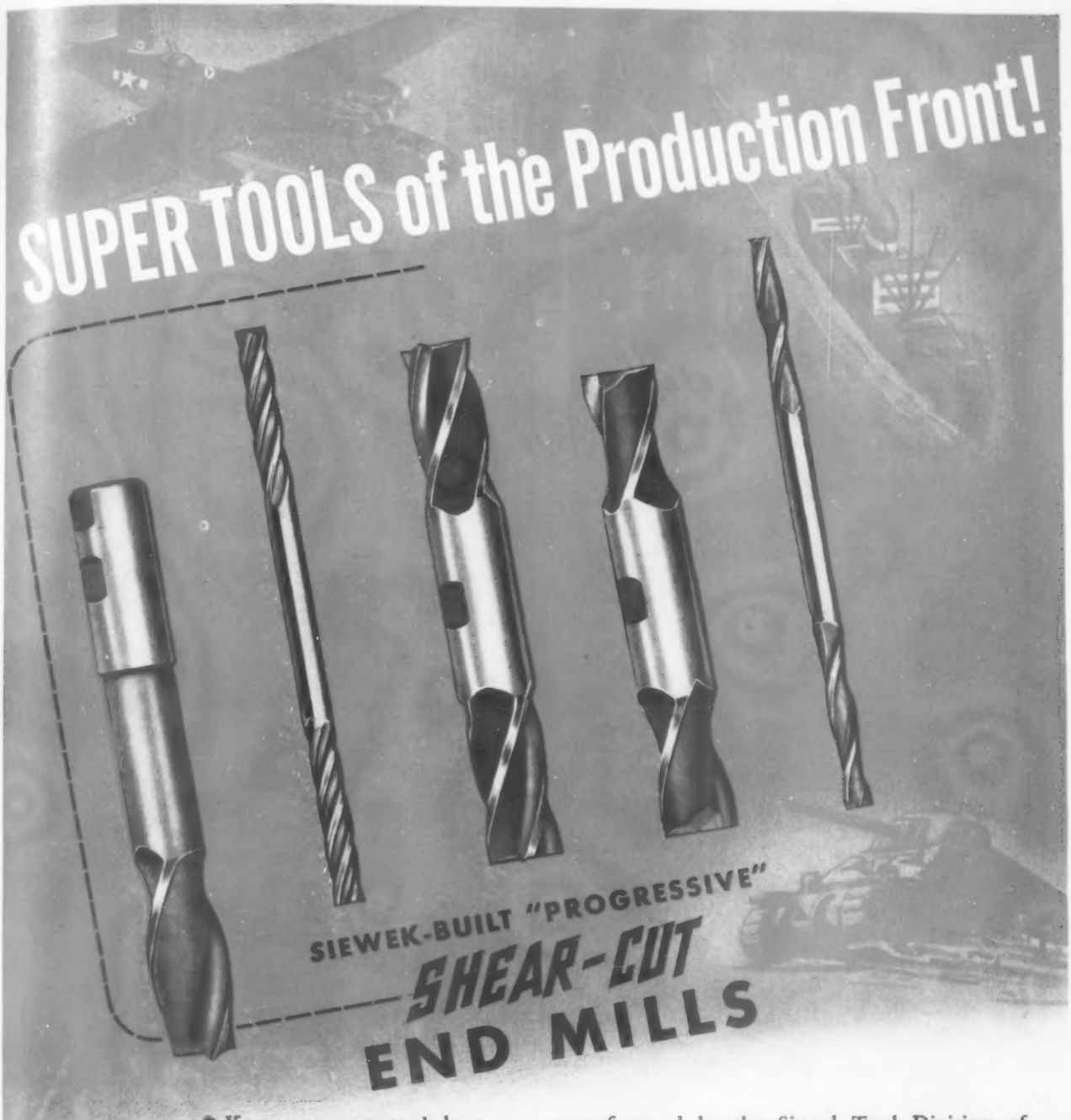


● Known as super tools because they cut so clean, fast and long, Progressive "Shear-Cut" End Mills are working overtime on superior American armament.

Precision made of the finest high-speed tool steel, these end mills feed accurately, minimize chatter, give uniform cutting action and adequate chip clearance . . . permit working to extremely close limits.

Progressive "Shear-Cut" End Mills are now manufactured by the Siewek Tool Division of Domestic Industries, Inc. . . . the same high character product, the same old family of skilled workers—plus the wider resources of Domestic Industries Inc. for added manufacturing facilities and improved customer service.

When you need end mills, think of "Shear-Cut." Their superiority is being proven daily in leading war plants all over the country.

SIEWEK TOOL DIVISION
OF DOMESTIC INDUSTRIES, INC.
Detroit (Ferndale Station) Michigan

Designers and Builders of JIGS, FIXTURES AND SPECIAL MACHINES

Distributors in Principal Cities
Affiliated with SIEWEK ENGINEERING DIVISION • Chicago, Detroit, Hartford, Conn. and Springfield, Mass.

FEDERAL *Taperlock* GAGE HANDLES

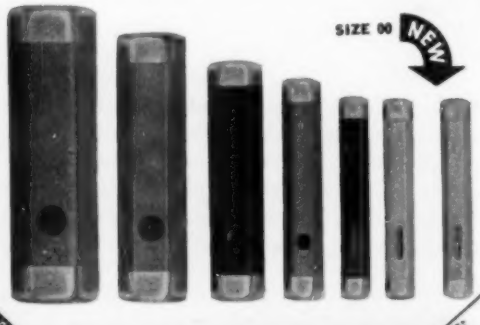
MADE of light weight plastic material, Federal Gage Handles are lighter than any metal used, even one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue in long continued use; an advantage appreciated by women inspectors.

They are highly satisfactory with glass gages being so much lighter than metal handles, they reduce the danger of chipping and breakage.

Insulating properties help prevent transmission of bodily heat to gages which may affect accuracy.

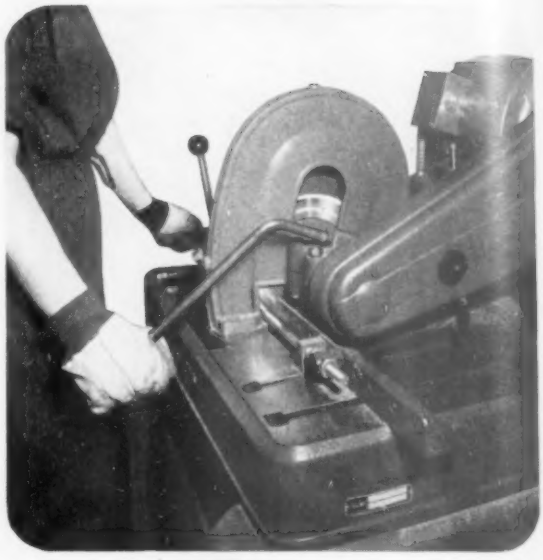
Marking for identification is accomplished with the same marking tools used for metal gages.

Immediate Shipments



FEDERAL TOOL CORPORATION
400 NORTH LEAVITT ST., CHICAGO, ILL.

This Problem was Solved by CIRCLE-R *Perfectionists!*



PROBLEM

To increase production in the cutting of brass tubing.

SOLUTION

The Circular Tool Co. recommended a saw designed to operate at 3,000 R.P.M. In this case it actually turned at 6,000 R.P.M. and stood up perfectly at this phenomenal speed. The resulting production was at the rate of over 2,000 pieces per hour. 50,000 pieces were cut before the saw required resharpening and 10 or 12 resharpenings were made before the saw became too small for this machine. Thus production per saw was between 500,000 and 600,000 pieces and tube cutting ceased to be a bottleneck.

★

This actual case history clearly illustrates the fact that Circular Tools are made by "Perfectionists" for exacting and special operations. Why not bring your metal cutting problems to their attention to-day?

CIRCULAR TOOL CO., INC.
PROVIDENCE 5, R. I.
CHICAGO · PHILADELPHIA · NEW YORK · DAYTON
LOS ANGELES · ROCHESTER · INDIANAPOLIS · DETROIT
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Precision on the ground
for Performance
in the air

SIDNEY LATHES

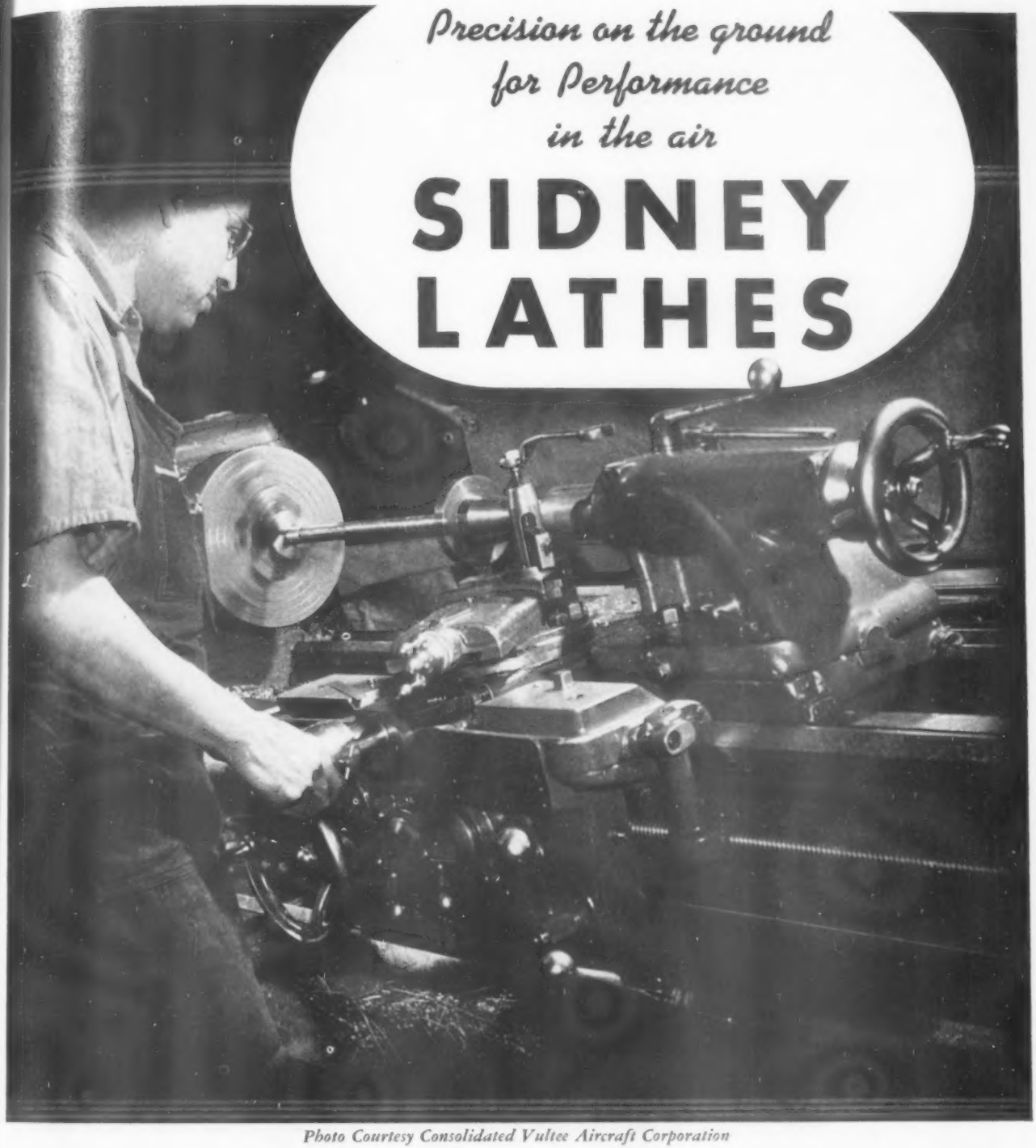

Photo Courtesy Consolidated Vultee Aircraft Corporation

● The every day run of turning jobs require the same precision—the same uniformity—the same high finish as the so called spectacular jobs. • Here a Sidney Lathe at Consolidated Vultee is meeting precision tolerances on a turning operation quickly — easily. • The convenience of controls at normal working position—the wide selection of feeds and speeds instantly available — the smooth flow of power from the continuous tooth Herringbone Geared Headstock all contribute to the accuracy and productivity of this Sidney Lathe. • And it is these Sidney Lathe qualities that make them so popular in the Aircraft Industry.

Bulletins on all sizes available.

SIDNEY
THE SIDNEY MACHINE TOOL CO. SIDNEY, OHIO, U.S.A.

The **SIDNEY MACHINE TOOL** *Company*

Builders of Precision Machinery

SIDNEY ESTABLISHED 1904 OHIO

SAFE-LINE

WIRE ROPE CLAMPS

THAT'S WHY IT NEVER SLIPS

FORGED and MASTER COINED To FIT The ROPE

TESTED and APPROVED

For SAFETY by UNDERWRITERS LABORATORIES—official testing laboratories for insurance companies.

FOR WIRE ROPES

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Ask Your DEALER

WRITE for complete details of this—the only PERFECTED wire rope clamp on the market. One clamp is guaranteed to hold any wire rope made. Millions used by Manufacturers, the Armed Forces and Industries.

NATIONAL PRODUCTION CO.

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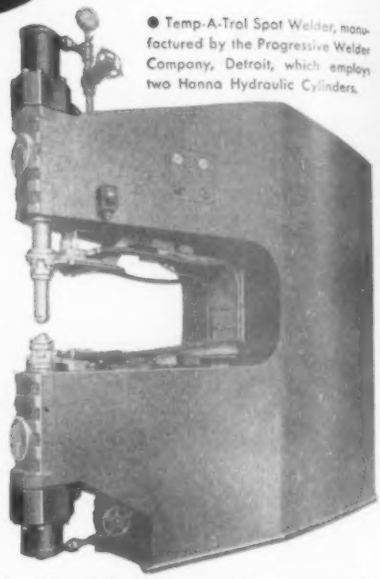
HANNA CYLINDERS

. . . where you need SMOOTH, DEPENDABLE power . . .

● Temp-A-Trol Spot Welder, manufactured by the Progressive Welder Company, Detroit, which employs two Hanna Hydraulic Cylinders.



. . . Spot Welding machines for example

Two Hanna Hydraulic Cylinders supply controlled power for this Progressive Temp-A-Trol Spot Welder —helping it produce "heat-treated" welds consistently.

The machine operates like this: the 1st of five stages, Hanna Cylinders advance the electrodes at low pressure until they contact the work. 2nd, Hanna Cylinders apply medium pressure to make the weld. 3rd, Under high pressure, and with the current off, material is literally forged together. 4th, At reduced heat and medium pressure, stresses in the material are relieved. 5th, Electrodes return to home position under low pressure. The complete cycle is fully automatic—current and pressure regulated by a thermocouple in the electrode.

● ● ●

This example of the versatility and adaptability of Hanna Cylinders is just one of 1001 ways in which Hanna Cylinders are used to advantage on machines and equipment. There is a standard Hanna Cylinder for nearly every conceivable application involving a pushing, pulling, lifting, pressing or clamping action. Their simple, compact design, and smooth dependable power make them ideal components of modern machines.

Investigate the advantages of using Hanna Cylinder power on the machines and equipment you design and build. A Hanna engineer will be glad to help you.

● Send for these catalogs —
330- Hanna Hydraulic Cylinders.
230- Hanna Air Cylinders . . . They give full data.

HANNA ENGINEERING WORKS

1765 ELSTON AVENUE • CHICAGO 47, ILLINOIS

AIR & HYDRAULIC CYLINDERS • RIVETERS • AIR HOISTS

Illustrated: A battery of heavy-duty drills—all Bakers—for machining forged steel flangings 1½" to 4" sizes.

- **OPERATION 1**
  Multiple drill 4 holes in flange on first two machines shown to right—Model 217 Bakers with flanged quill and fixed center multiple spindle heads.
- **OPERATION 2**
  Burr bolt holes on portable mounted electric drill.
- **OPERATION 3**
  Bore center hole. This job is handled on two Baker 314-A universal quick change type machines.
- **OPERATION 4**
  Face top hub of flange on Baker 314-A universal quick-change type machine.
- **OPERATION 5**
  On last machine in line, a Baker 150, chamfer both sides of center bore.

BAKER Heavy-duty Drills have flexibility that will be vitally important to you in post-war production

★ ★ ★ Flexibility is a "must" in the varied and strenuous operations of war production. Yet, in building machines for war output, Baker has an eye to the future. When peace comes, these versatile machines will turn to work on normal goods with a minimum of conversion. Change-over is rapid and easy, they are of rugged design to permit maximum speeds and feeds of tools, fixtures and tools are simple, and they are easy to operate.

Baker Brothers, Inc.
Toledo, 10, Ohio

DRILLING • BORING • TAPPING • CONTOUR GRINDING MACHINES

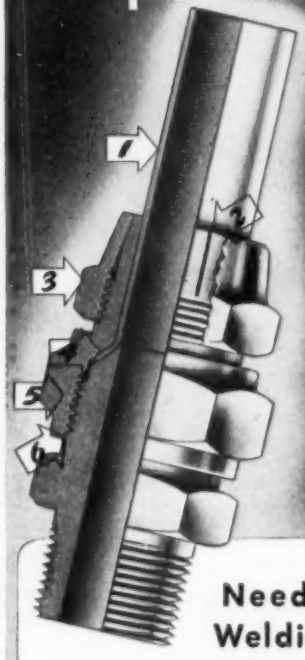
BAKER

COLLET GRIP

Seals as it grips

TUBE FITTINGS

For Leak-proof, Vibration-proof Connections!



1 Permit use of tubing in wide range of wall thicknesses.

2 SLOTTED collet insures uniform grip of tubing surface, protecting flare seal.

3 COMPRESSION NUT compresses Collet Nut to tube, forming permanent collet grip that cannot loosen.

4 DESIGN directs pulling stresses and vibration strains away from angle of flare.

5 COLLET NUT has long bearing surface which grips tube securely beyond the flare.

6 Easy to assemble and disassemble. Use repeatedly.

Need No Threading Welding or Soldering

"Collet Grip" fittings provide connections as strong as the tubing itself—without threading, welding or soldering. A compression nut compresses the collet nut to tube, giving it a firm, uniform grip that cannot loosen under vibration or shock. The long bearing surface of the collet nut puts the heavy load on the tube and fitting—*not on the flare.* "Collet Grip" fittings work perfectly on metal tubing having a wide variety of wall thicknesses, and permit quick, easy installation of short lengths of tubing in close quarters, without bending or damage to tube.

Send for Copy of Catalog 43 containing complete information.

COTNER-WILKINSON COMPANY

Division of Logansport Machine Co., Inc.

LOGANSPORT, INDIANA

DOUBLE NUT COLLET GRIPS

—as illustrated above, are made in 5 standard shapes. Special shapes and sizes to specifications.

COLLET GRIP

SINGLE NUT COLLET GRIPS

Simplified for close work, yet retaining all features of Collet Grip design. Five standard shapes, sizes from ¼" to 1" Special sizes, shapes to specifications.

Speed Inspection in YOUR plant with this

EASY-TO-READ EASY-TO-USE Production Gage

Priced from $9.75 up

Would you like to know more about the new, war-born TRICO MICRO-CHEK now speeding up the gaging of millions of precision parts in over 3300 war plants? How inexperienced girls quickly become dependable inspectors? Send for our booklet which shows many applications of this accurate, speedier comparator gage.

TRICO **MICRO-CHEK**

TRICO PRODUCTS CORP.

6 Trico Square, Buffalo 3, N.Y.

Columbia TOOL STEEL

TOOLS—

Good tool steel tools are making possible today's mass war production.

Tool design, tool makers' skill and good tool steel are responsible for this outstanding accomplishment.

It pays to use Good Tool Steel.

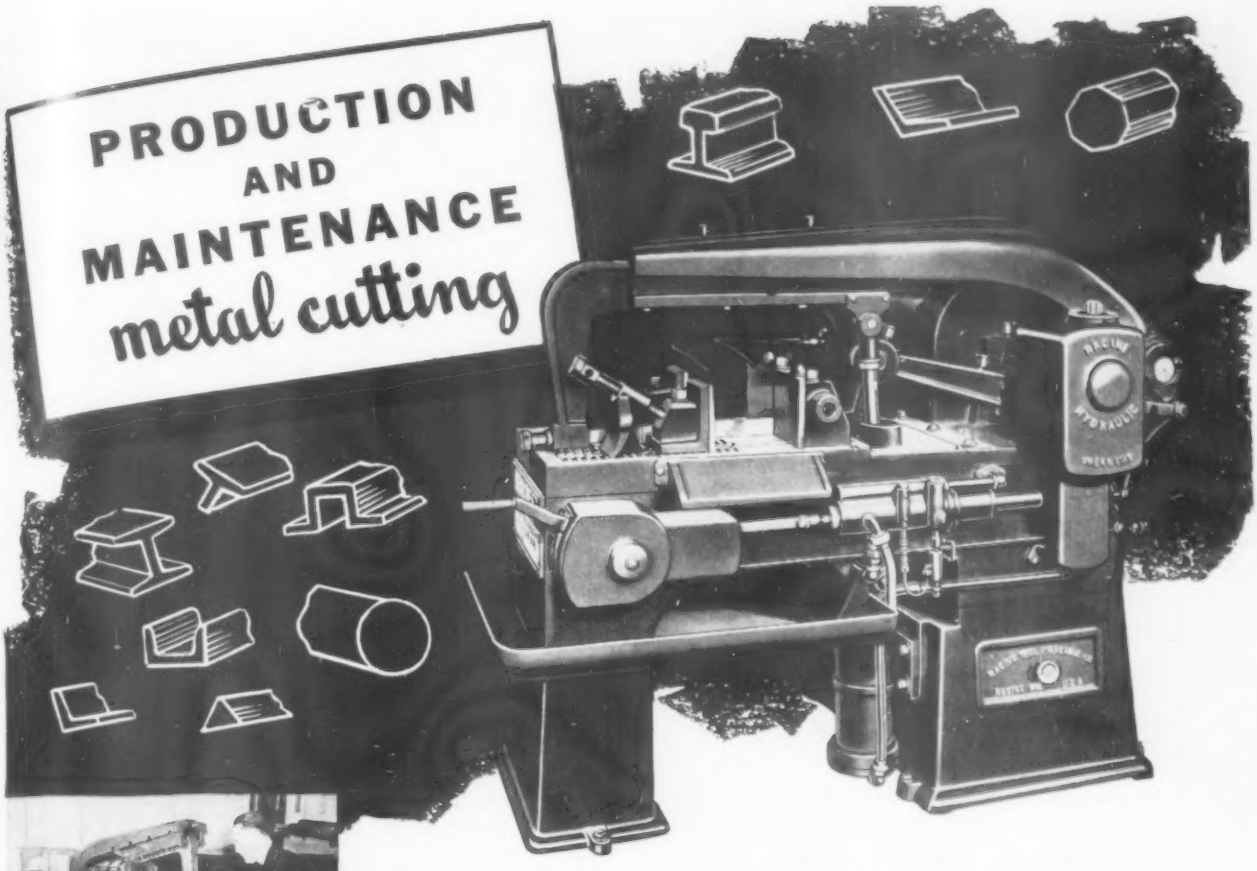
COLUMBIA TOOL STEEL COMPANY

ARTHUR T. CLARAGE, PRESIDENT

GENERAL OFFICE AND WORKS

520 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

PRODUCTION AND MAINTENANCE metal cutting



Flexible hydraulic feed speeds the cutting of this large I-beam.

Hydraulic operation insures fast accurate cutting of heavy bars.

with RACINE *hydraulic* HEAVY DUTY METAL saws

The Racine Heavy Duty Production Saw has a progressive combination "Positive" and "Flexible" hydraulic feed. The "Positive" feed predetermines cutting time. Each cut, even though it be made in tough alloys or tool steels, is made in exactly the same length of time.

The "Flexible" feed permits blade to cut faster when resistance is reduced. Faster cutting is attained in round bars, tubing, through the thin section of structurals and other shapes, by the use of this feed. This progressive combination "Positive" and "Flexible" feed is exclusive with Racine.

Racine's complete saw line includes a wide range of machines. Models are available to meet the varied requirements of all metal working industries. Capacities from 6" x 6" to 20" x 20".

Write for complete catalog and time study of your work. Address Dept. TE-S.

RACINE OIL HYDRAULIC PUMPS AND VALVES

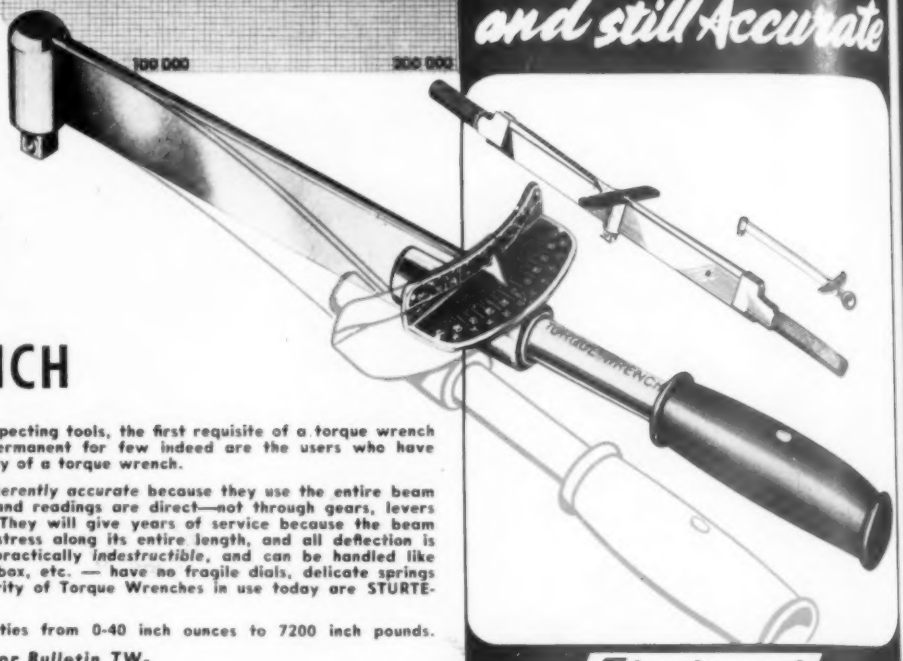
Racine "Variable Volume" Oil Hydraulic Pumps and "Balanced Piston" Valves provide special advantages for hydraulic circuits in a wide variety of applications. Pump capacities of 12 20 and 30 G.P.M. Operating pressures 50 to 1000 lbs. Valves in all sizes to 1½". Write for Catalog P-10-C today.

200,000 DEFLECTIONS and still Accurate

Permanently Accurate

STURTEVANT QUALITY

TORQUE WRENCH



As in any other measuring, limiting and inspecting tools, the first requisite of a torque wrench is accuracy. This accuracy should be permanent for few indeed are the users who have means of periodically checking the accuracy of a torque wrench.

STURTEVANT TORQUE WRENCHES are *inherently accurate* because they use the entire beam of the wrench as the measuring element and readings are direct—not through gears, levers or other error-compounding mechanisms. They will give years of service because the beam is ground to uniformly spread operating stress along its entire length, and all deflection is well within its elastic limits. They are practically *indestructible*, and can be handled like any other tool, on the bench, in the tool box, etc. — have no fragile dials, delicate springs or wearing parts. That is why the majority of Torque Wrenches in use today are STURTEVANT TORQUE WRENCHES.

Over 100 models and types with capacities from 0-40 inch ounces to 7200 inch pounds.

Write for Bulletin TW-

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Darwin

PRK-33
COBALTCROM

Air Hardening, Non-Deforming,
Cobalt High-Carbon, High Chromium Steel

In your change-over and re-tooling operations, we refer your Tool Engineer to PRK-33 Cobaltcrom. This alloy tool steel is the ideal material for extended runs and better production records.

We can ship forged discs and ring forgings promptly.

Bar Stock and Billets in Stock. Drill Rods Furnished on Order.

DARWIN & MILNER INC.
highest grade tool steels
1260 WEST FOURTH STREET
CLEVELAND 15, OHIO

LONGER LIFE
for TAPS AND REAMERS!

Instead of discarding taps and reamers that produce oversize or bell-mouthed holes, try this simple experiment. Change over to a Ziegler Floating Tool Holder and see if the real trouble isn't faulty spindle alignment.

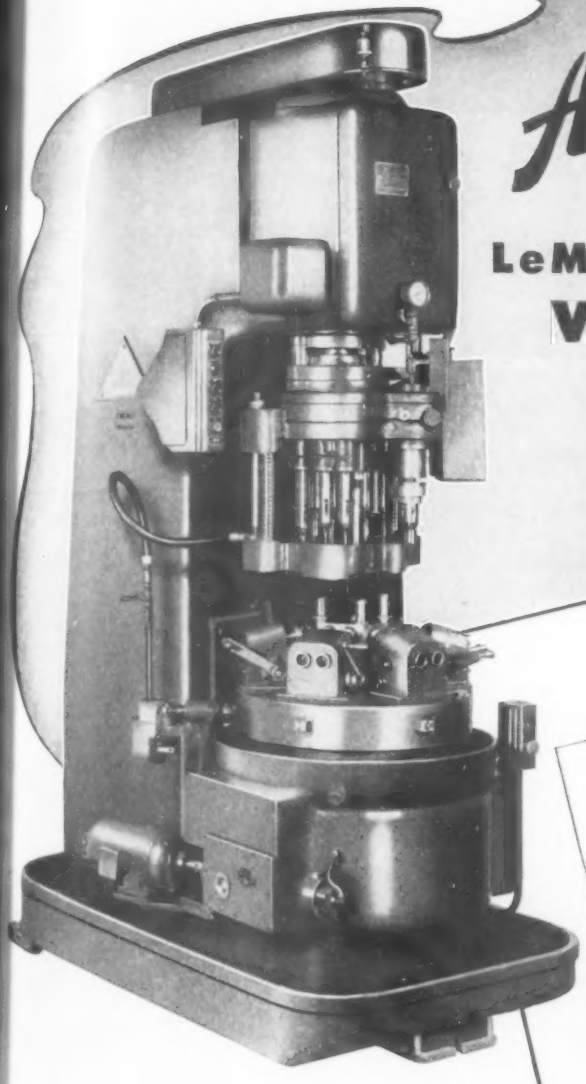
By compensating automatically for inaccuracies in the alignment of the spindle with the work, the Ziegler Holder makes it possible to turn out first class work even if the spindle is out of alignment as much as 1/32".

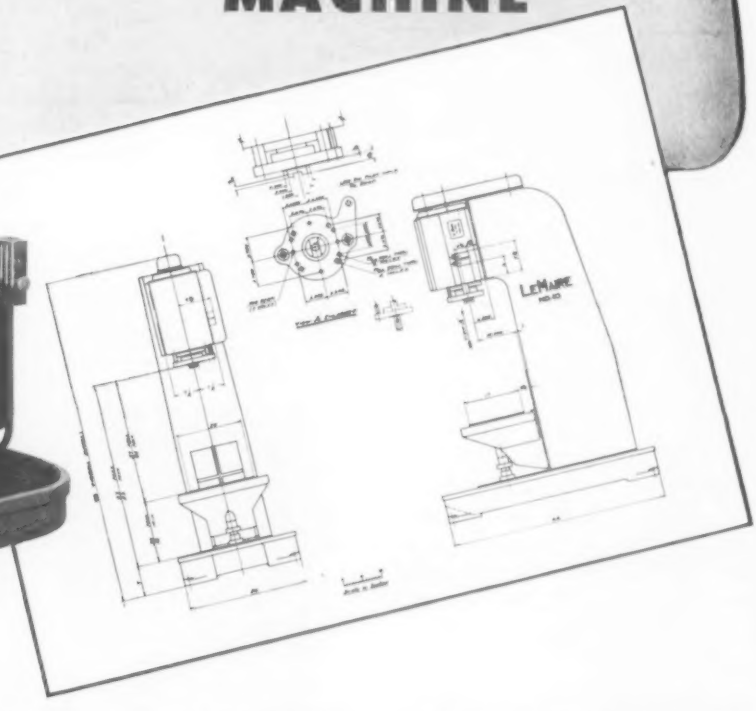
W. M. ZIEGLER TOOL CO.
1920 Twelfth Street Detroit 16, Mich.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

Another APPLICATION OF THE LeMaire No. 10 Standard VERTICAL DRILLING MACHINE





This LeMaire Standard Vertical Drilling Machine lends itself to many applications. Here the standard Twin Ram Unit is equipped with a multiple head carrying 10 spindles for drilling, rough and finish counterboring, and tapping. (Tapping spindles are an auxiliary attachment in the head.) All these operations are performed in one cycle of automatic index table having 5 working stations and 1 loading station. The machine produces 300 pieces per hour. The detailed diagram enables you to determine how adaptations can be made to your requirements.

Standard vertical machines are available in three sizes—3 to 15 H.P. Standard horizontal machines are available with six sized units from ⅓ to 20 H.P.

Consult us NOW regarding your postwar plans in production.

BUY WAR BONDS

LeMaire TOOL & MFG. CO.

2663 S. TELEGRAPH ROAD ▲ DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

One proposed use for obsolete war planes is for the quick freezing of foods. Cargoes of freshly picked fruits and vegetables may be flown directly from the fields to high altitudes. There the compartments will be opened and the contents immediately frozen by the intense cold.

More than 2,000 varieties of plants have been tested for rubber during the last year.

A resin bonded panel of plywood, with a sprayed coating of steel, has eight times the strength of either material alone.

Electronic hearing devices are now so sensitive that the growing noises of a blade of grass may be heard.

One use suggested for the Helicopter is to carry girders and beams to high buildings or bridges and hold them in place while they are being fastened. This would make derricks, elevators and cranes unnecessary for this purpose.

Magnets are being used by draftsmen to hold drawings in place on steel-cored drafting boards.

Three stages of post-war development in railway locomotives are predicted. First, the high-efficiency turbine, using super-heated steam at 600 to 700 degrees. Second, the oil-burning internal combustion turbine. Third, the same type of turbine with a gas-producer using coal.

A small hand tool now "spot-welds" thermoplastic resins electronically.

So rapid are changes in technology that, for purposes of government bookkeeping, synthetic rubber plants are assumed to become obsolete in five years.

Transparent plastic, reinforced with glass fibers, is being used in aircraft construction. The material is said to have ten times the impact strength of ordinary plastics.

For twenty years people have been laughing scornfully at the "seadromes", 65,000 ton, 10 million dollar islands for transatlantic passenger planes. Now that seemingly fantastic project is being seriously considered by several large steel, shipbuilding and air transportation companies. Supported on floats 160 feet below water and extending 70 feet above the surface, the seadromes are unaffected by waves and would furnish a safe, level landing and refueling place as well as luxurious hotel accommodations.

Steel alloys, whose exact compositions are unknown, can now be quickly identified by the use of a small radio-like apparatus.

The most powerful electric motor in the world has recently been completed. It develops 7,000 horsepower at a speed of 25 r.p.m.

Seventy-two refineries are now making 100 octane gasoline, the production of which has increased 400% in the last year, and is expected to double again in the year ahead.

By the use of a new ultra-high frequency, resonator telephone engineers expect to send six-hundred thousand conversations or television pictures at one time through a six inch pipe.

A new balance will weigh as little as two-hundred millionths of an ounce. The pointer is so tiny that it must be read through a microscope.

The carbon brushes used in the various electric motors of fighting airplanes are small, but vital. A new chemical process is reported to increase their life fifty times, and to prevent breaking down at the low temperatures in which they must operate at high altitudes.

Punched plastic sheets are now being used in place of cedar separators in storage batteries.

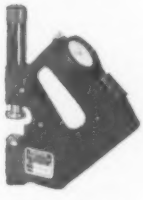
Check AIRCRAFT MECHANICAL PARTS

FASTER
CONFIDENTLY
ACCURATELY
from Layout thru Final Inspection

MASS production of interchangeable parts requires *faster more positive*, and *less personal* inspection. Gages such as these provide modern methods for controlling dimensions in *both* production and inspection. With a Dial Indicator Gage you *see*, quickly and positively whether the work dimension is correct. They require less trained skill to use than old fashioned type gages. For detail information write

FEDERAL PRODUCTS CORPORATION
PROVIDENCE 1, R. I.

Left — THREAD GAGE. Checks pitch diameter faster, more positively than conventional gages. Adjustable for diameter.

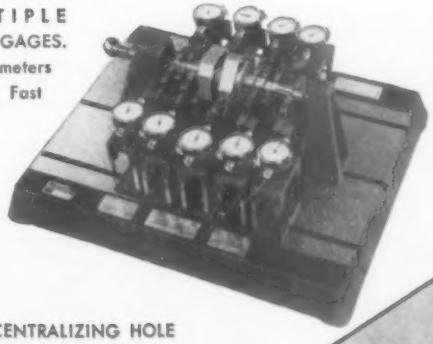


Left — SNAP GAGE. You can see with this gage faster than you can feel with a "fixed" gage.

Right—COMPARATOR. A sensitive instrument with fine adjustment for tool room or production use.

Above — CALIPER GAGE. A "handy" gage for various types of work such as patterns, cores, castings, plastics, bottles, etc. to specified dimensions.

Right — MULTIPLE INSPECTION GAGES. Checks nine diameters simultaneously. Fast and adjustable.



Chicago • Cleveland • Detroit • Dallas • Hartford • Houston • Indianapolis • Los Angeles • Memphis • Milwaukee • Minneapolis • Montreal • New York • Philadelphia • Pittsburgh • Rochester • San Francisco St. Louis • Toronto • Windsor

Left—CENTRALIZING HOLE GAGE. You can "explore" a hole for roundness, taper, shallow or high spots as well as diameter with this.

DIAL INDICATORS AND INDICATOR GAGES

★ ★

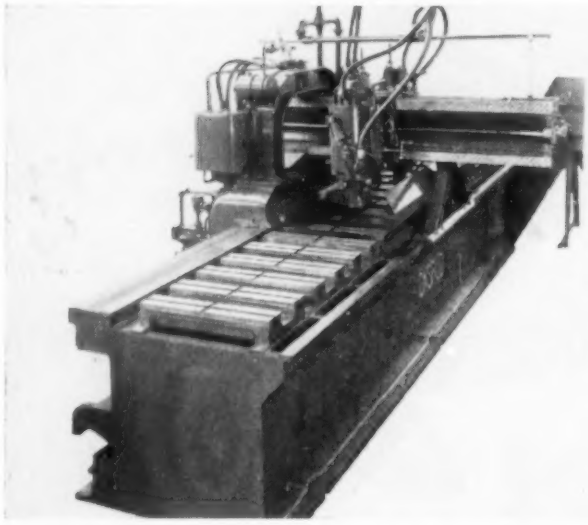
FEDERAL ★

PRECISION MEASURING INSTRUMENTS

NEW EQUIPMENT

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

• Materials + Processing •



Miller For Machining Bevels With Surface Width up to 8"

Metal-Cutting Power Saw With Micro-Set Length-of-Cut Gage

ONSRUD DEVELOPS NEW HIGH SPEED MILLER (N8)

A new type high speed nonferrous milling machine has been developed by Onsrud Machine Works, Inc.

Designed to mill a long flat bevel on aircraft wing and fuselage sheet stock, the miller will machine bevels with surface width up to 8". Surfaces are milled to a mirror finish in a single pass and have been checked and found true flat to .0001", according to the manufacturer.

The machine consists of a long bed and T-slot table on which work is held. A carriage travels over the bed to move the cutter head along the work. Two cutter heads, each of which may be tilted as much as 15° off perpendicular, are mounted on a bridge arm carriage.

For a straight line bevel, work is set up on the table so that the bevel mills will be parallel to the direction of carriage travel. The bridge arm is positioned to form a 90° angle with the length of the bed and direction of carriage travel.

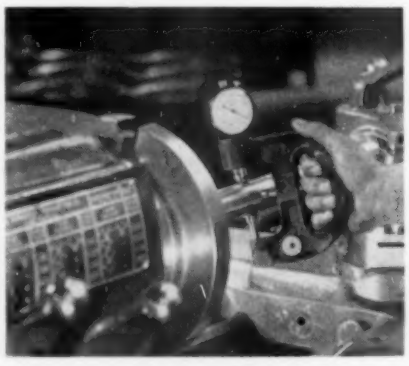
For a bevel on a taper or crosswise edge, work is milled by moving the cutter head in a vertical or untilted position across the bridge arm screw. Work is held in a fixture in a tilted position plane to the angle of the bevel required. Length of this type bevel is limited to the length of motor travel across the bridge arm.

DIAL SNAP GAGE MAKES COMPARATOR TYPE TEST (N9)

Sheffield Corporation has announced an improved line of dial indicator adjustable snap gages designed to fill the gap between conventional snap gages and high precision visual gages.

Because the dial indicator gage is as portable as the conventional snap gage, the operator can make a comparator type check without moving work from the machine. This feature saves many hours on production and fills the needs of small shops as well as large plants for quality dimensional control of machining, grinding, and lapping operations, according to the company. It also frequently is used for inspecting finished parts at the bench and for classifying parts that cannot be checked with other types or comparators. The gages are available in twelve models covering a range up to 12".

The normal position of the indicator is at the lower end of the gage frame, permitting the weight to be carried on the stationary anvil. Where it is impossible to use the gage in this normal position, however, it can be reversed, with the indicator on top, without impairing accuracy of the reading.



Dial Snap Gage

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

METAL CUTTING SAW GAUGES LENGTH OF CUT (N10)

The Peerless Machine Company has announced an improved model metal cutting power saw incorporating a hydraulic micro-set gauge mounted on the conveyer to accurately gauge the length of cut.

Features of the machine are vernier finger-tip screw control of feed pressure, a four-sided saw-frame which completely surrounds the blade and the work, a backing-plate blade-support to permit maximum feed pressure with minimum strain on the blade, ground and renewable inserts and bearings, and dual hydraulic balancing cylinders. The 7" and 11" automatic models can be converted in any shop for handling a single bar or nest of bars or tubes.

VERNIER GAGE EXTENDS RANGE OF GAGE BLOCKS (N11)

A new vernier gage that extends the range of combinations of sizes which can be made with any set of gage blocks has been announced by Continental Machines, Inc.

According to the manufacturer, the DoAll vernier gage extends the range of any set of gage blocks, enabling combinations to be made in steps of ten micro-inches and to the same degree of accuracy as provided by precision gage blocks. Gage blocks in combination with the vernier gage can be quickly set up to produce practically all types of snap gages, height gages and depth gages to millionth accuracy at a fraction of the cost of a special gage. Also, in combination with gage blocks a precision sine bar can be set to angles within two seconds of an arc, enabling tool makers and inspectors to measure any dimension to within ten micro-inches.

The gage consists of two gage blocks

(Continued on page 166)

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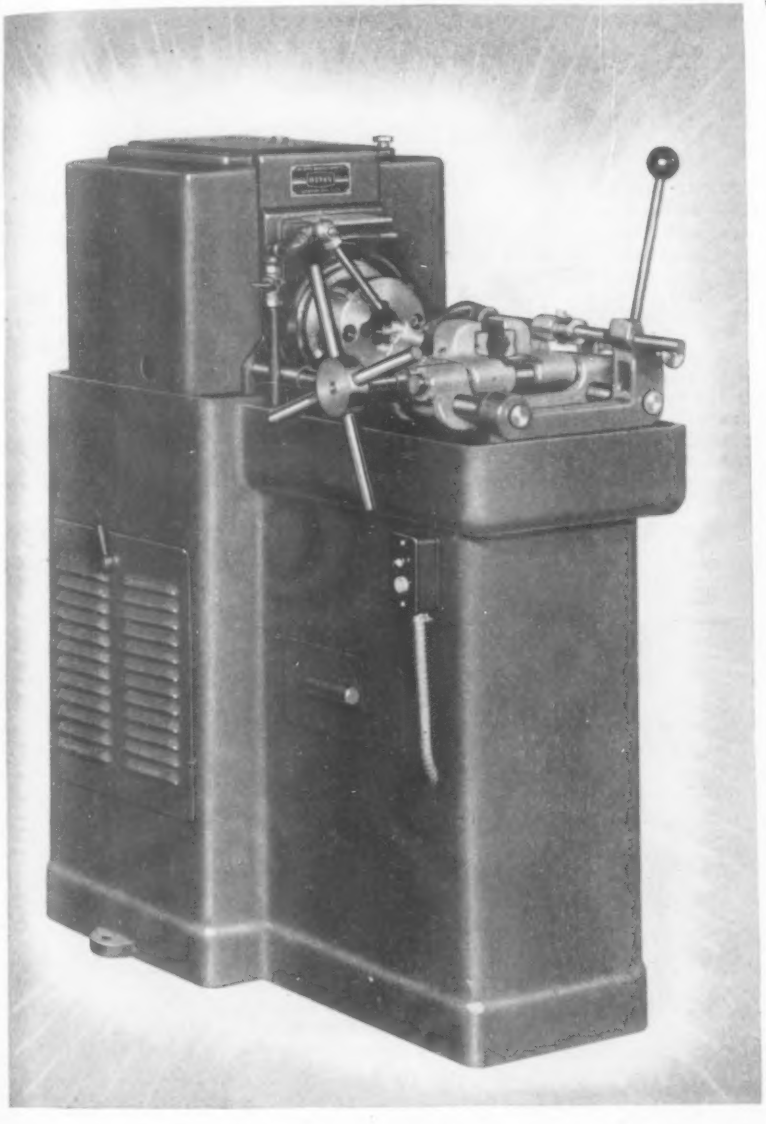
Recommend the Oster *"RAPIDUCTION JUNIOR"*

for a wide Variety of Bolt and Pipe Threading Work



1 **DIE-HEAD**..rotary type..fully adjustable.

2 **DIES** . . . segmental type . . . *high speed steel* . . . one or more can be replaced without renewing entire set.

3 **DIE RELEASE** . . . automatic, with emergency hand trip . . . dies reset to size automatically.

4 **STOCK STOP** . . . adjustable . . . automatic in operation.

5 **VISE** . . . open type . . . with hardened steel gripping jaws . . . quick acting and powerful.

6 **VISE CARRIAGE** . . . lever fed . . . heavily constructed . . . and mounted on 1¼" solid steel studs rigidly supported at both ends to maintain perfect alignment.

7 **MOTOR** . . . 2 H. P., 1800 RPM . . . totally enclosed in base . . . protected from dirt and chips.

8 **DRIVE FROM MOTOR**..by V belts and motor and sheaves . . . eliminates noisy gears . . . prevents mechanical shock and sudden overload. V belts fully protected from oil and grease.

9 **WORM GEAR DRIVE** . . . hardened and ground steel worm running in BALL BEARINGS . . . bronze worm gear.

10 **MACHINE DRIVE SHAFT** . . . runs in BALL BEARINGS.

11 **SPINDLE** . . . hollow, for cutting threads of any length . . . semi-steel construction . . . runs in BALL BEARINGS.

12 **OIL PUMP** . . . easily accessible . . . insures full, uniform flow of cutting oil to dies . . . adjustable relief valve . . . pump shaft mounted in BALL BEARINGS.

13 **MOTOR CONTROL** . . . conveniently located . . . well protected.

14 **POSITIVE LUBRICATION** . . . oil level sight gauge makes it easy to keep oil at proper level to lubricate worm drive and all working parts which run in oil.

15 **BASE** . . . all steel . . . strongly braced for maximum rigidity . . . wide flaring pan prevents waste of cutting oil . . . keeps chips off floor.

16 **STEEL GUARDS** . . . easily, quickly removable for access to motor, pulleys, and oil pump.

17 **CHASER TRAY** . . . in base for convenient storage of spare chasers.

Oster "RAPIDUCTION JUNIOR" Threading Machines are made in one size: **No. 542** with regular bolt range: 3/16" to 1½" N.C. or Whitworth and 3/16" to 1¼" N.F. or B.S.F. Regular pipe or nipple range ⅛" to 1¼". **WRITE FOR CATALOG LIST No. 23.**

OSTER *for faster, better threading*

THE OSTER MANUFACTURING COMPANY, 2063 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.

INFORMATION FREE

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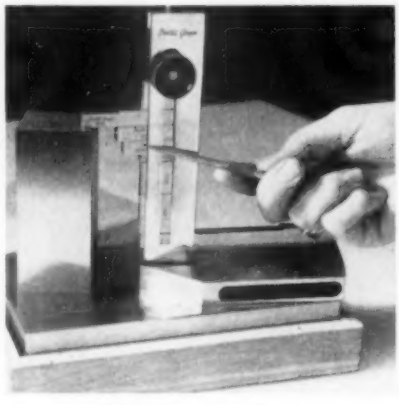
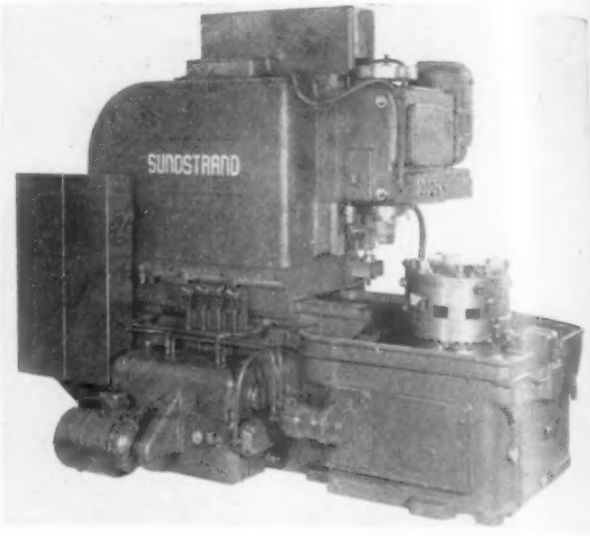
having a precision taper on their mating faces. The taper faces of two blocks are wrung together with their taper index marks coinciding. One block is graduated into ten equal parts between the index graduations, and by sliding this block to the right the height of the vernier gage is increased ten millionths for each graduation because of the taper. By sliding the block to the left, the height is decreased ten millionths of an inch for each graduation.



DoAll Vernier Gage

Newly-Designed Milling Machine For Form and Profile Milling



SUNDSTRAND MILLER DOES FORMING AND PROFILING *(N12)*

A newly-designed milling machine, developed especially for form milling the radii and angle on the inside of propeller blades, but available also for profile milling operations, has been announced by the Sundstrand Machine Tool Co.

An angular milling cutter with a radius on the bottom, using high speed steel blades, is mounted directly to the spindle which is driven by a 10 hp. motor. Pick-off gears provide spindle speed changes in a ratio of 30 to 1. The column carries the vertical way surface for vertical travel of the spindle head and can be fed and traversed to and from the workpiece.

Principal features of the machine are a solid spindle type table with widely suspended bearings to provide rigidity for heavy milling cuts, and automatic cycle which provides three independent motions — cross feed to the column, vertical feed to the head, and rotary feed to the table — all timed and interlocked with the starting and stopping of the spindle and coolant flow.

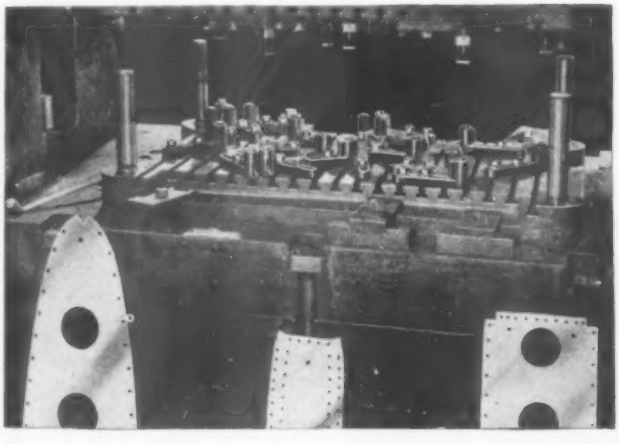
(Continued on page 168)

PUTNAM Has 761 Items In Stock
One Is The Right Tool for Your Job
Pick up the Putnam catalog and select the end mill, counterbore or chucking reamer that meets the particular requirements of your job. We can ship any item listed in our catalog immediately and it will be in your hands within 48 hours.
Whether the job calls for a heavy cut, a smooth finish, or finishing an intricate contour you can count on Putnam Hi-Speed End Mills to deliver top performance. Why buy ordinary tools when you can get the best without delay?
ARMY E NAVY
PUTNAM TOOL COMPANY
2987 Charlevoix Avenue • Detroit 7, Michigan

YOU COULDN'T ASK FOR ANYTHING MORE SIMPLE — OR BETTER THAN

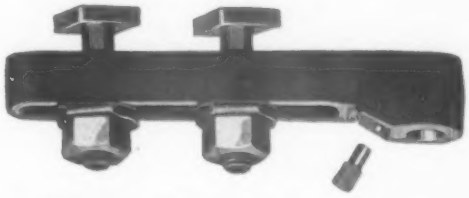
WHISTLER ADJUSTABLE PUNCH and DIE UNITS

Whistler Adjustable Dies work on any type press and because of their simplicity even new workers quickly learn to make pattern change-overs—increasing productive press hours. Absolute precision on short or long runs. Whistler design permits more perforations in a given area—often reducing press operations. For quick and complete information on the advantages of Whistler Adjustable perforating and notching dies send a description or drawing of your work.



These pieces produced with Whistler Adjustable Dies clearly illustrate the re-use of same punch and die units.

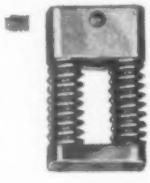
These photographs show the simplicity of a Whistler Adjustable Punch and Die assembly. Every piece is interchangeable.



Self-locking bolts on punch holder drop into T slots of die shoe. Set-screw engages into recess at base of punch. Punch cannot turn or pull out in operation.

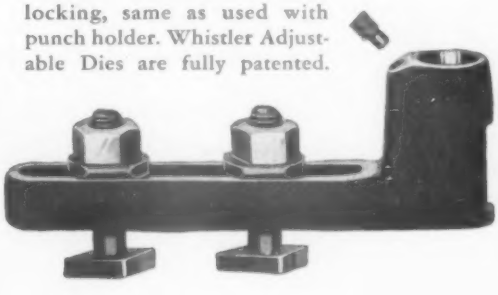
Punches of finest tool steel are machined to .0001" tolerances.

Stripper unit fits smoothly over punch—no "wobble". Flushed set-screw engages into groove on punch body. Stripper or punch quickly removed when desired.



Grooved heads on dies make lifting from holder quick and easy. Like the punches, dies are held firmly into holder by set-screw in recess at base. Whistler *precision* is known the world over.

Die holder has self-cleaning slug chute. Special design bolt heads present two bearing surfaces to T slot channel—self-locking, same as used with punch holder. Whistler Adjustable Dies are fully patented.



Write for the Whistler Catalog—every Production Executive should have it.

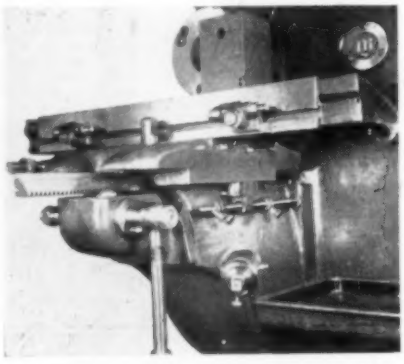
S. B. WHISTLER & SONS, Inc.

Over 25 Years of Tool and Die Making Experience

752-756 MILITARY ROAD BUFFALO, N. Y.

TRANSVERSE FEED MAKES NICHOLS MILLER FLEXIBLE (N13)

Built especially for the Nichols milling machine, a new development in the form of a lever, rack and pinion transverse feed arrangement is announced by Nichols-Morris Corp. It can be substituted for the regular transverse feed screw to give added operational flexibility. According to the manufacturer the principal advantage is that it gives the milling machine, table, and saddle the same flexibility of movement as found in the conventional lathe carriage and cross slides. Work can be chucked lathe-fashion on the spindle with tools mounted on the table, or vice versa. When used in combination with high spindle speeds and carbide tipped tools the miller may be used for boring, facing, counterboring, turning, profiling, and recessing.



Transverse Feed Attachment

NEW GEAR CHUCK REDUCES DISTORTION (N14)

Designed to give greater accuracy to holes bored or ground in gears because of its unique method of gripping, a new gear chuck has been developed by LeMaire Tool & Mfg. Co.

Designed to accommodate either external or internal helical and spur-tooth gears, the grippers of the chuck exert pressure through the cross section of the tooth and not through the center of the gear. The manufacturer points out that distortion on delicate gears will not occur as easily as it would in chucking across the diameter.

The chuck consists of two gripper plates, one stationary and the other moveable. Each has a set of grippers ground to close limits and positioned accurately. There are no cams, adjusting screws, or sliding jaws to become worn or get out of adjustment. To grip a gear, one plate carrying a set of grippers rotates toward the stationary plate causing grippers to clamp each side of the tooth.

The company states that many operations can be performed with this chuck, such as finish boring, facing, counterboring, and grinding and finish shaping one set of teeth from another as in the case of countershaft or cluster gears.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

LeMaire Gear Chuck

NEW MACHINE DUPLICATES PARTS FROM FORGED STOCK (N15)

A high speed duplicating machine for quick and accurate production of parts from forged stock has been developed by the Century Engineering Company.

Expensive dies and forgings are unnecessary for a limited production run with this machine, according to the company, and setups are made quickly and easily because skilled labor is not required.

Two spindles, with a speed of 10,000

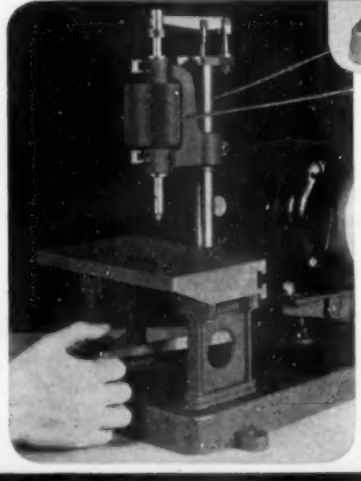
(Continued on page 170)

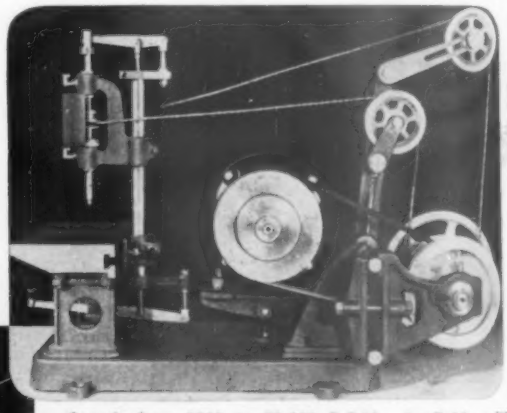
MICROSCOPIC DRILLS ARE *JUST RIGHT* FOR THE

Super sensitive

L & D HIGH SPEED DRILL PRESS

Take the tiniest drill you can find and try it on the L & D Super Sensitive Drill Press. You will find this combination ideal. Why? Because the L & D has speeds up to 23,000 R.P.M. — speeds that make those hair-like drills really cut. And the chances for drill breakage are minimized, because the L & D has a fingertip control that even gives green operators the "feel" of the cutting action. It all adds up to precision production at surprisingly low cost. Send the coupon for details.





Speeds from 3000 to 23,000 R.P.M. Available with one, two, three or four spindles.

Please send me complete details on the Super Sensitive Drill Press.

NAME..... TITLE.....

COMPANY.....

STREET.....

CITY..... STATE.....

T.E.

EDWARD BLAKE COMPANY

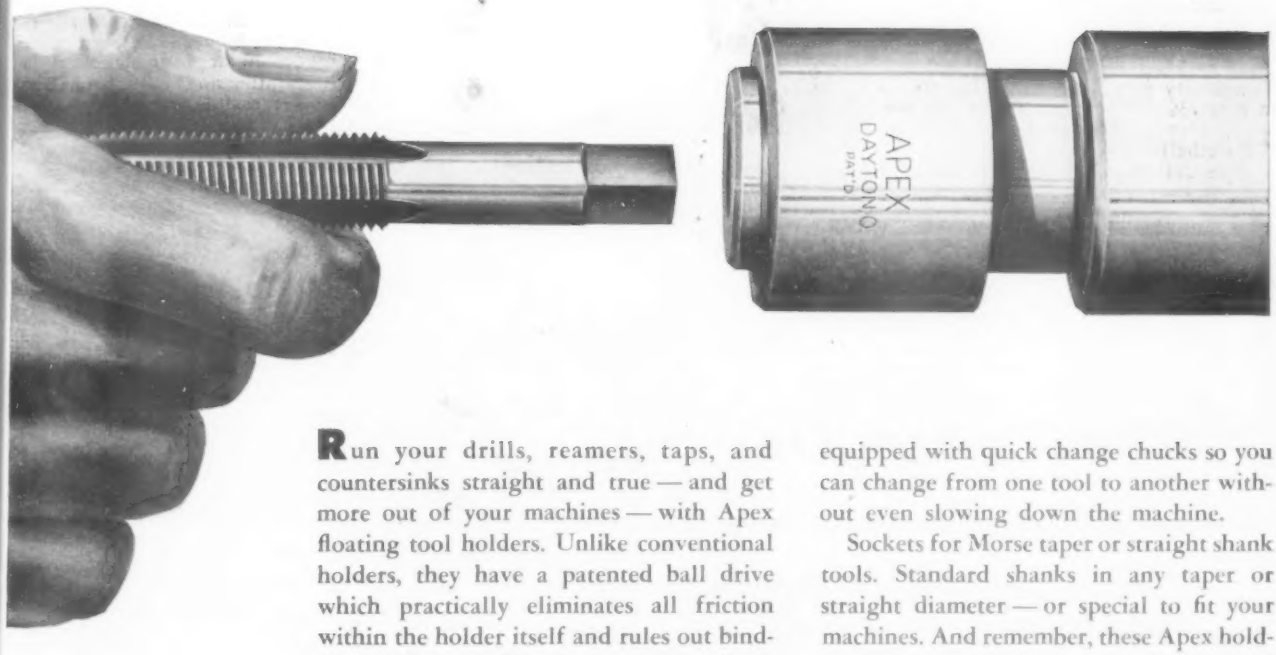
634 COMMONWEALTH AVE., NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS—L & D HIGH SPEED DRILL PRESSES—WALTHAM CUTTER SHARPENERS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS

Drill, Ream, Tap, Countersink

More Accurately

with Apex Floating Tool Holders Equipped with Drill Chuck Bottoms!



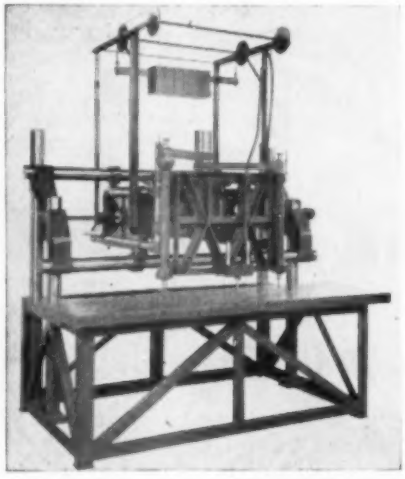
Run your drills, reamers, taps, and countersinks straight and true — and get more out of your machines — with Apex floating tool holders. Unlike conventional holders, they have a patented ball drive which practically eliminates all friction within the holder itself and rules out binding under load. Use them on either horizontal or vertical spindles. Buy them equipped with quick change chucks so you can change from one tool to another without even slowing down the machine.

Sockets for Morse taper or straight shank tools. Standard shanks in any taper or straight diameter — or special to fit your machines. And remember, these Apex holders are a part of a large, versatile family of production tools. Write for Catalog No. 14.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.



High Speed Duplicating Machine

rpm. are driven by a 10 hp. motor. Operation is manual in the vertical and fore and aft planes, with longitudinal movement controlled by the switch buttons located at the top of each handle. This control moves the carriage right or left to determine the amount of cut.

INDUCTION HEATING UNIT HAS PORTABLE FEATURE (N16)

Mobility is the principal feature of a new 7½ KW induction heating machine recently introduced by the Ohio Crankshaft Co.

The unit provides a wide range of induction heating for brazing, annealing, heating for forming, and for hardening small parts, according to the company. The machine is ideally suited for use in the shop tool room because it is especially designed for the brazing of carbide tip tools.

The machine features a work unit separate from the power unit. If desired, the mobile top can be removed to facilitate shop operations and is connected to the power unit by a cable that need not be limited as to length.

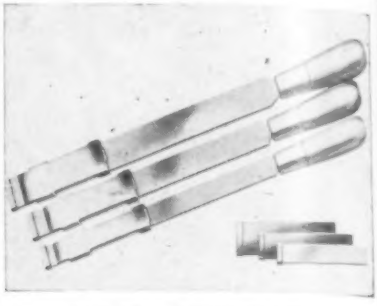
INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

Portable Induction Heater

CARBOLOY-TIPPED SCRAPER BLADES NOW AVAILABLE (N17)

Anderson Bros. Mfg. Co. has announced a Carboloy-tipped scraper blade



Carboloy-Tipped Scrapers

available in three widths to fit the company's standard line of hand scrapers.

According to the manufacturer, all that is necessary is to remove the high speed steel blade and slip in the Carboloy tipped blade. The company reports that the blades have been on test in large manufacturing concerns for several months and have proved extremely successful, lasting from eight to ten times longer than ordinary blades.

(Continued on page 172)

Added Strength Saves Replacements

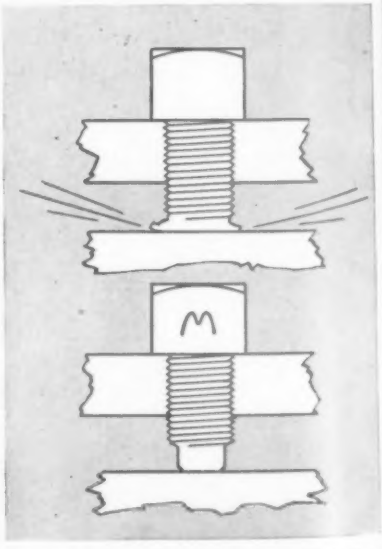
These Screws Have a Place in Your Plant

Where tremendous gripping power is necessary and projecting heads present no hazard, there is no substitute for just plain strength. Broken screws, upset points and fatigue failure can be avoided by specifying stronger screws.

Mac-it Square Head Set Screws are heat-treated for maximum torsional strength and to resist upsetting of the points. A 5/8" Mac-it, for example, has a gripping power of more than 25 tons!

Mac-its

PRONOUNCED "MACK-IT"



OTHER MAC-IT PRODUCTS INCLUDE:
Hexagon Socket Cap Screws • Hexagon Head Cap Screws • Hollow Set Screws • Hollow Pipe Plugs • Stripper Bolts

4321

Strong, Carlisle & Hammond Company • Cleveland, Ohio

Broaching by *American*

PROVEN in war . . .

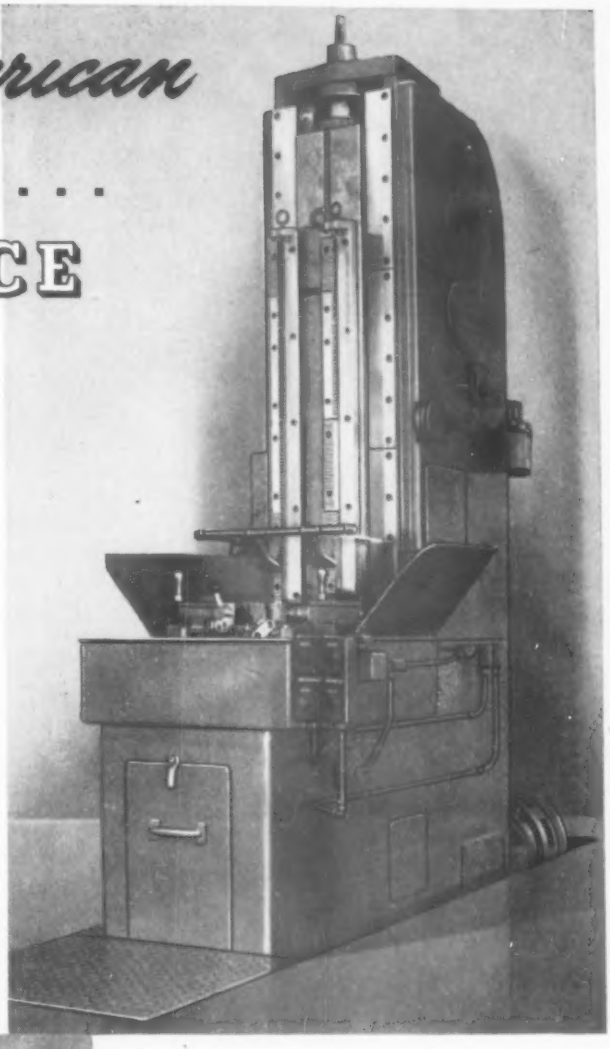
Ready for PEACE

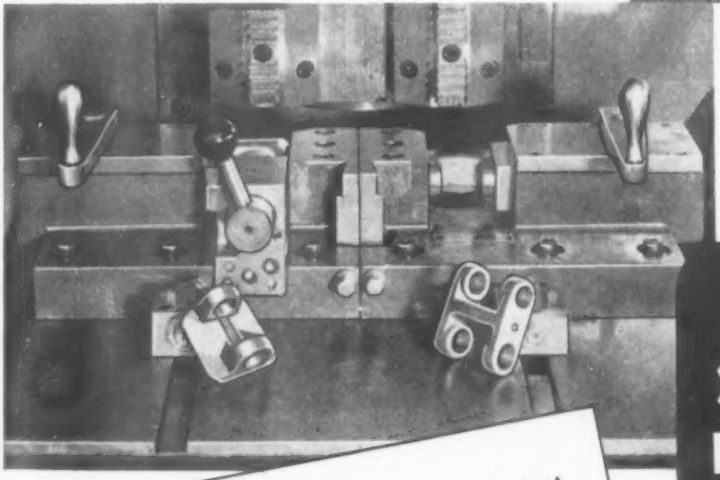
When war's demands made necessary precision production on a mass production basis, many leading production engineers turned to broaching—by *American*.

A typical example: finishing the surfaces between the bosses on aircraft universal joint parts. American Broach and Machine Company engineers—identified with broaching since the turn of the century—assumed responsibility for complete broaching equipment for this job. An *American* SB-54-10 single ram machine with receding work table was provided, equipped with a two station fixture designed to broach two end parts and one center part for a balanced production in each two machine cycles. (See illustration below.)

This is but one of the many war jobs where broaching by *American* is providing faster, more accurate and more economical production. When production planning is undertaken for peacetime products, *American*'s complete service—machines, tools, and engineering—will be available.

Broaching is better the *American* way — proven in war, ready for peace!





(Above) *American* SB-54-10 Machine. Loading and unloading are synchronized with the machine cycle so that down time is zero . . . production high . . . finish excellent.

(Left) Parts broached in this operation are shown installed in the fixture, with two completed parts lying on the front of the table.

Use proper and sufficient lubrication when broaching. It is cheap life insurance for broaching tools.

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS

COLLET CHUCK FEATURES SELECTIVE PRESSURE (N18)

A new collet chuck, employing a full circular, low-pressure cam to activate the collet closing mechanism and assure desirable gripping pressure for various materials, has been announced by Allison Tool & Engineering Co.

Low-Pressure Collet Chuck

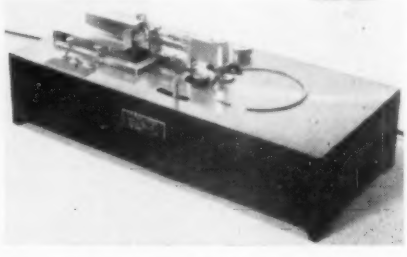
The collet is available in two sizes, one for 1½" 8 thread spindles with ⅞" collet capacity and one for 2½" spindles and under with 1⅝" collet capacity. According to the manufacturer, the use of the circular cam with its large area, reduces the pressure at any point approximately 90 per cent as compared with collet closing mechanisms utilizing high pressure, pins, wedges or dogs. Being of circular nature, the chuck is adaptable to polishing lathes and other high speed spindles requiring balance. The operating handle travels at right angles to the lathe bed allowing the operator one free hand to feed the stock and operate the bed turret.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

NEW PILOT FIXTURE AIDS PISTON RING CHECKING (N19)

A new piloting fixture for aiding checking of surface roughness of piston rings, has been announced by Physicists Research Co.



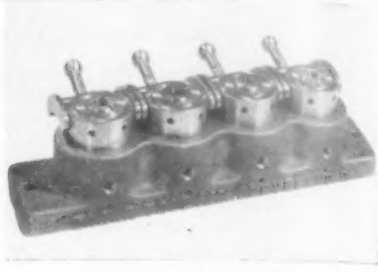
Piston Ring Checking Fixture

The fixture, designated as Type R, works in conjunction with any Profilometer, and may be used for measuring side surfaces of all types of rings, including keystone rings.

Measuring may be performed in three ways: by tracing circumferentially, by tracing radially at one place on the ring, and by a combination of both at the same time. Operation is automatic.

MULTIPLE COLLET FIXTURE BOOSTS MILLER OUTPUT (N20)

A multiple collet-holding fixture designed for greater working capacity on large milling machines and to make possible numerous set-ups to boost output with accuracy, has been announced by Zagar Tool Co., Inc.



Multiple-Collet Holder

The multiple fixture consists of four holding fixtures in either the 1" or 2" size which can be mounted either par-

(Continued on page 174)

Buhr

KNOWS THE COMBINATION TO SOLVE YOUR PRODUCTION PROBLEMS

Typical example of Buhr Engineering is this 38 Spindle Buhr Horizontal Drill Head for drilling 31-"F" and 7-5/16 dia. holes. This is the left hand head of a 2-way Hydraulic Horizontal Machine.

Send blueprints for suggestions and recommendations to speed *Your* production for quicker victory.

BUHR MACHINE TOOL COMPANY

ANN ARBOR MICHIGAN

YOUR COPY OF THIS BOOK IS OFF THE PRESS . . . SEND FOR IT TODAY!

● Do you use radius forming diamond tools in your shop? If so, you'll want a copy of this new book—just off the press. It illustrates and describes the complete line of radius forming diamond tools designed and manufactured by Wheel Trueing Tool Company . . . the most complete line on the market today. And it explains why these tools that are engineered to the job produce such accurate work, give such dependable performance, speed production and provide such money-saving economy. It is a book you should read . . . and will want to keep for future reference.

We have a copy of this new book waiting for your request. Write today.

WHEEL TRUEING TOOL COMPANY

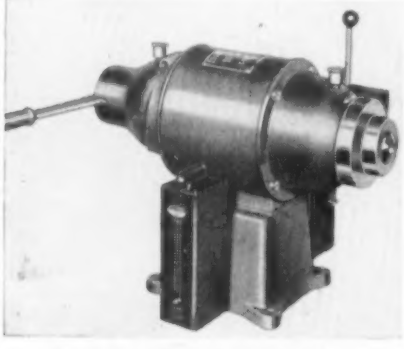
3200 W. Davison Ave. Detroit 6, Michigan

allel with or at right angles to the spindle. Two, three, or four collets, or multiples thereof, can be used. An indefinite number of multiple fixtures can be used at once, the only limit being the length of the table.

Center to center of collets is 3¼" on the 1" fixture and 5½" on the 2" fixture. However, two fixtures can be staggered reducing the distances to 1¾" and 2¾" respectively. If the miller is equipped for climb-cutting, two fixtures can be mounted on each side, making a total of 16 collets on one set-up. Chip trouble is eliminated by forcing the coolant upward, washing the chips away.

SPEED LATHE DEVELOPED FOR FINISHING PARTS (N21)

A new model general purpose speed lathe, especially designed for de-burring, lapping, polishing, or finishing small metal or plastic parts, has been announced by Schauer Machine Co.



General Purpose Speed Lathe

Features of the machine are streamlined design, forced ventilation cooling, positive air filter to remove dust and abrasive particles, and a new fully enclosed-type switch to eliminate danger of switch breakdown under adverse operating conditions.

BLAKE ANNOUNCES NEW DUST COLLECTOR (N22)

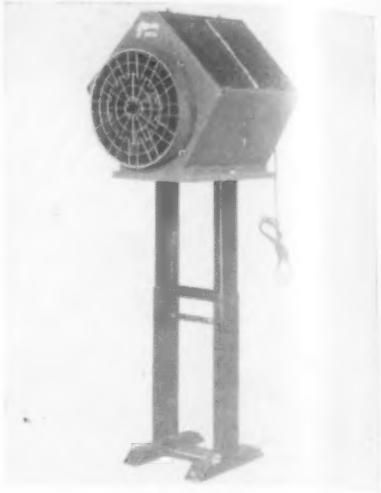
A new portable dust collector, known as No. 2 Filtaire, has been announced by Edward Blake Co.

The unit can be used with dry grinding and polishing operations and is completely portable so that it can be moved anywhere in the shop where a 110-volt outlet is available. According to the company, the No. 2 model has many improved features, including new intake and exhaust design. All dust within a wide area in front of the unit is drawn in by the fan which then deflects the air upward by a baffle plate where it is exhausted through two replaceable filters at the top.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

The motor is mounted behind the baffle plate, completely out of the airstream, and the drive shaft is mounted front and rear in dust-proof bearings which are furnished with grease gun fittings. Adjustments are provided for raising and lowering the unit as well as moving it back and forth, eliminating the need of any special hoods, piping or similar devices.



Portable Dust Collector

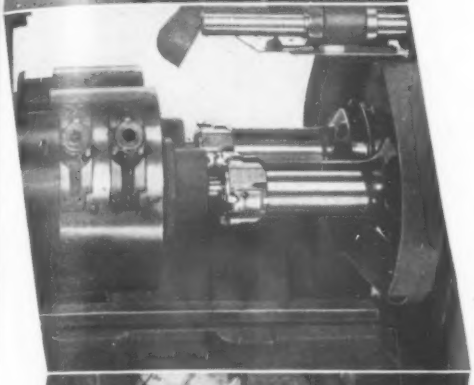
NEW GRINDERS EQUIPPED FOR MAGNESIUM GRINDING (N23)

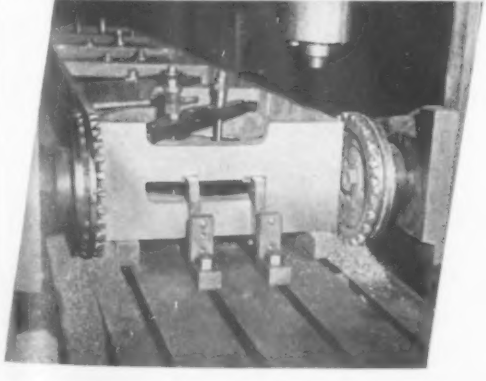
Hammond Machinery Builders, Inc. have announced a line of newly equipped grinders for magnesium grinding.

The company's 10", 12", and 14" grinders are equipped with heavy plate

(Continued on page 176)

New SINGLE-PLUNGER DESIGN
SIMPLIFIES INSTALLING
AND MAINTENANCE . . .
DOUBLE PILOT OPERATED
Solid bar-stock brass housings are provided with conveniently located holes for mounting-bolts. Inlets and outlets inside facilitate connecting up and give ample room for piping. Also make it possible to service if necessary without dismounting housing.
Quick acting, readily adaptable, simple in construction, long wearing, Q. A. W. single-plunger control valves present machine designers every desired advantage. Made in more than 50 different styles, hand-lever, pilot or mechanically operated. Send for Catalog No. 6.
THE HIGHER THE PRESSURE THE TIGHTER THE SEAL
AIR WATER OIL
C. B. HUNT & SON
1868 E. Pershing Street
SALEM . . . . . OHIO
Quick–As–Wink
Single-Plunger CONTROL VALVES





LOCKED *positively*

LOVEJOY MILLING CUTTER BLADES

are therefore ideal

when tipped with CARBIDE

The advantages of carbide tipped milling cutters are known to all progressive manufacturers. Of prime importance in choosing the *right* cutter is the consideration that higher speeds, heavier cuts and coarser feeds are encountered.

Lovejoy Milling Cutters, with POSITIVE-LOCKING, carbide tipped blades, are the *right* cutters for these tougher requirements. This is why—(1) tips are backed up with husky steel blades, (2) serrations are on the front of the blade, *not* on the back or locating side, (3) short blades are held as solidly as new blades, so *all* the carbide can be used, (4) housings are precision machined, tough steel forgings, (5) blades are easily, *and positively*, locked, (6) Standard sizes of blades are carried in stock for immediate shipment.

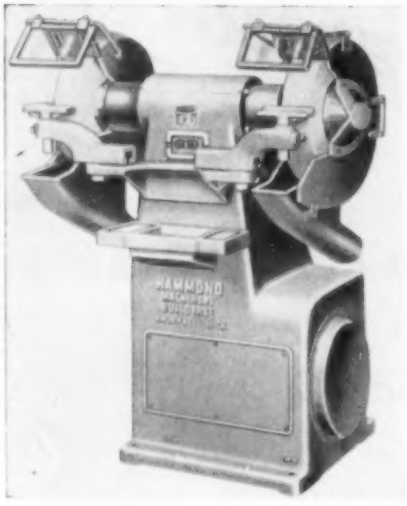
There are standard and special Lovejoy Milling Cutters for every requirement.

Write for Catalog No. 26 today!

LOVEJOY

TOOL COMPANY, Inc.

SPRINGFIELD, VERMONT, U.S.A.



Hammond Magnesium Grinder

wheel guards which have direct exhaust outlets for connection to a dust collecting system. The machines also are equipped with explosion proof electrical equipment.

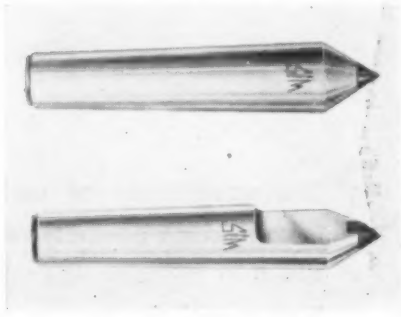
Features of the grinders include larger oversize spindles for smooth operation, large bearings sealed against dust and grit, and multi-V-belt drive.

CARBIDE INSERT PROLONGS LIFE OF LATHE CENTERS (N24)

Longer service life, achieved by extension of the carbide insert into the shank of the tool, is claimed as a principal feature of new lathe centers and half centers, introduced by Wendt-Sonis Co.

The extension is equal approximately to the exposed portion of the tip allowing extra regrinds before need of replacement, should the bearing surface of the tip become damaged, according to the company.

These lathe centers are guaranteed to a concentricity within .0002" or less, permitting finish grinding to closer tolerances, the company adds. The lathe centers are especially advantageous for finish turning and grinding.



Carbide Insert Lathe Centers

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

MAGNETIC COMPARATOR DETECTS VARIATIONS (N25)

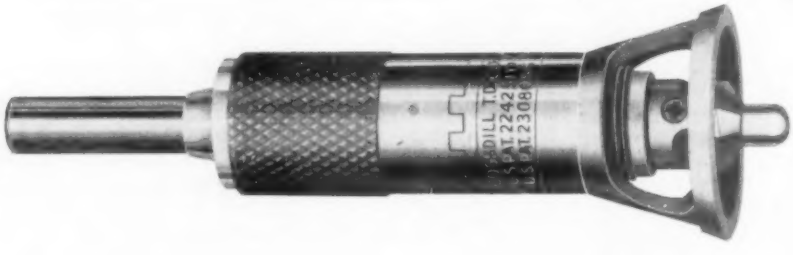
Designed for controlling quality of ferrous parts, a new magnetic comparator has been announced by General Electric Co.

G. E. Magnetic Comparator

The unit detects any difference in two parts tested, one of which is a check, and shows up deficiencies caused by wrong composition, improper heat treatment, hardness or size, and other properties which affect the magnetic flux within the coil. The comparator is sensitive enough to distinguish between steels whose hardness varies as little as two points Rockwell when hardness difference is the sole variable. It is designed particularly for the fabricator of iron or steel parts who needs a non-destructive test to make certain that each part has the required properties within the limits of a standard part.

(Continued on page 178)

1913



1944

STOP COUNTERSINK HOLDER

—Extensively used by aircraft manufacturers for depth controlled countersinking of rivet holes.

—Available in several sizes with wide range of countersink angles and pilot sizes.

—Adaptable for counterboring or spotfacing where accurate depth control is essential.

DESCRIPTIVE LITERATURE UPON REQUEST

★

TWIST DRILLS, CENTER DRILLS, REAMERS, COUNTERBORES, AEROMATIC DRIVES, PILOTS, AND COUNTERSINKS

★

COGSDILL TWIST DRILL CO.

P. O. BOX 97

COLLEGE PARK STATION

DETROIT 21, MICH.

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LET US ENGINEER YOUR DRILL AND REAMER PROBLEMS

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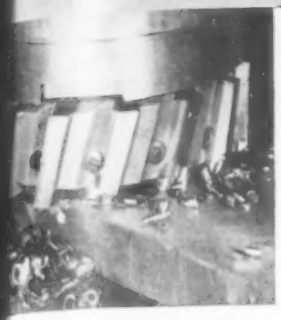
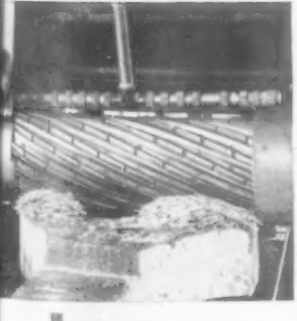
INGERSOLL CUTTERS AND CUTTER GRINDER..





INCREASE PRODUCTION AND TOOL LIFE

NX FACE MILLS are recommended where a cutter of general application is required capable of taking heavy cuts on both periphery and face in steel or cast iron.

SHEAR CLEAR FACE MILLS are a patented cutter designed to cut continuous chip materials such as steel, aluminum, and copper at increased feed rates. They produce a smoother finish, give longer tool life, and use less power. Application limited to flat surfaces.

END MILLS with solid shanks are designed for milling small faces, steps, or grooves; or for heavy cuts with stock to be removed by both face and periphery of cutter. End Mills are also available with Ingersoll helical blades illustrated at left.

SIDE MILLS and Staggered Tooth Slotting cutters of all types are manufactured by Ingersoll for a wide range of applications from very light cuts to railroad rod channeling.

HELICAL SLAB MILLS are efficient and renewable inserted-blade cutters with blades forged, twisted, hardened, and then ground to true helix to fit accurately helical milled slots in body. Also made as solid shank end mills.

WRITE *for Engineering Specification Sheets for full description of Ingersoll standard inserted blade cutters.*

CUTTER GRINDER shown above will grind in a single setting of the cutter the face, periphery, and corners. Capacity, 4″ to 30″ in diameter with 7″ maximum peripheral face. It will grind face mills, solid shank, radius, staggered tooth, and angular inserted blade cutters. It is fast, accurate, and may be operated by the average mechanic. Write for Catalog No. 54 for complete details and operating instructions.

Ingersoll manufactures a complete line of inserted blade type milling and boring cutters for all purposes. Your inquiries will receive prompt attention.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.

NEW GUSHER PUMP DRIVEN BY BELT (N26)

A new belt driven gusher pump that operates in a vertical position and is propelled by a No. A "V" belt using a

Ruthman Gusher Pump

detached motor or drive shaft has been announced by The Ruthman Machinery Co.

The unit employs a one-piece shaft which revolves on two high grade ball bearings mounted within the tubular section between the plate flange and the "V" pulley. The pump stem, flange, and impeller housing used in this model, known as 1-P3, are interchangeable with those used in the company's motor driven model 1-P3 pump.

NEW TOOL REMOVES VALVE SEAT INSERTS (N27)

A new tool for removing valve seat inserts from aircraft and automobile motors and a new valve stem bushing remover have been developed by the Invincible Tool Co.

Designed primarily to meet the need for an aircraft motor valve insert remover, the tool also may be used for

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

removing valve seat inserts from automobile motors. The bushing remover extracts worn valve stem bushings, facilitating free operation of the insert remover and offers a safe, sure method of expediting an ordinarily difficult operation, according to the company.

METAL FINISHING PROCESS REDUCES HAND WORK (N28)

The Sturgis Products Co. announces that hand finishing and de-burring are largely eliminated by use of its new process called Roto-Finish.

The process somewhat resembles tumbling or barrelling, but is vastly different in results, the company states. It reports that in one airplane plant, time and labor on burring were cut 65 per cent by use of the process.

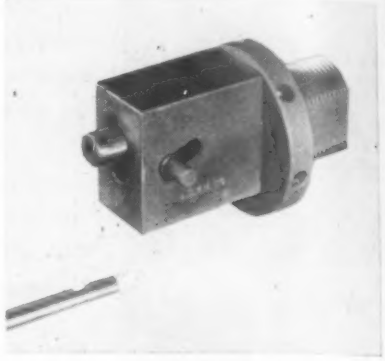
Roto-Finish is a process with controlled rotary action, together with use of special chips and compounds. Tested formulas governing the amount of chips and compound, the weight of parts, the operating time for various materials, and desired results have been worked out and are made available to the users of the process.

BROACH PULL HEAD MAKES REMOVAL EASY (N29)

Designed for use with small pull broaches having shanks ½" in diameter and smaller, a new round pin type broach head has been introduced by American Broach & Machine Co.

When inserted into the head, the broach is pushed in to a point where the pin will slip automatically into the notch. The mechanical pressure back of the pin is sufficient to seat it posi-

(Continued on page 180)



Broach Pull Head

LIBERTY Proves ONE Equals TWO

When You Use Liberty High Speed Grinding Attachments

Here is a machine tool which will DOUBLE the potential capacity of your surface grinders.

Model No. 90-31
Set at 90°, grinding a gage seat in a hard-to-get-at place. Can be set to any angle within 180°.

LIBERTY HIGH SPEED GRINDING ATTACHMENTS are precision built for intricate and hard-to-get-at precision grinding jobs.

Model No. 90-31
Sharpening broach with 5° clearance.

Model No. 90-31
Grinding hardened flats and blind slots in restricted working space.

Model No. 90-31
Grinding hardened work seat ordinarily hard to get at.

WRITE FOR FURTHER INFORMATION

LIBERTY TOOL & GAGE WORKS, INC.
233 GEORGIA AVE. PROVIDENCE 5, R. I.

MIDWEST TAPER AND PIN DRIVE TYPE END MILLS *permit maximum* SPEEDS AND FEEDS

MIDWEST END MILL
Taper and Pin Drive makes tool changes possible in minimum time

END MILL HOLDER
gives perfect alignment to operation — no loose parts easily dislocated or lost

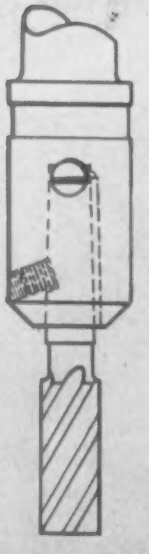
MIDWEST

THESE HIGH PRODUCTION TOOLS OFFER THE POSSIBILITY OF INCREASING YOUR PRODUCTION

Midwest End Mills are made with a high helix angle (fast spiral) to provide maximum speed in action, and with plenty of chip room to prevent clogging of chips in the flutes.

The Midwest Taper and Pin Drive tool holder has a round pin partially imbedded in the wall. A corresponding keyway in the tapered shank of the end mill fits this pin. As a result full driving energy is exerted along the entire length of the end mill shank. A safety lock screw holds the shank firmly in place. The drive is positive, rigid and always perfectly aligned.

These features in Midwest Pin Drive End Mills permit higher speeds and feeds; they result in greater production, more accurate work and exceptionally high finishes in milling operations.



ASSEMBLY VIEW
showing Midwest Pin Drive with safety lock screw

MIDWEST

Precision METAL CUTTING TOOLS

END MILLS • SLEEVES • COUNTERBORES • SPECIAL TOOLS • DRILLS REAMERS • FORM TOOLS CARBIDE TIPPED TOOLS ADJUSTABLE HOLDERS

MIDWEST TOOL & MFG. CO. • 2364 W. JEFFERSON AVE. • DETROIT, MICHIGAN

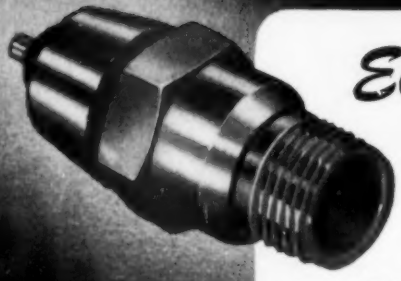
Reduce Your Costs for Bigger Profits

SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT

INCREASED PRODUCTION

- High Speed Machining
- Excellent Tool Life
- Minimum Machine Run-out



Eliminated Rejections

This Spark Plug Shell was machined on an Automatic at 302 S.F.P.M. with a bright, smooth finish. To eliminate rejections due to a crimping operation customer changed from B1113 to Speed Case X1515. Estimated Savings per ton of Steel Used $37.39.

If you wrote your own specifications for the ideal, all purpose, open hearth carburizing STEEL, it would be . . . SPEED CASE!

BUY WAR BONDS

Write for **SPEED CASE CATALOG.** *Actual shop records showing savings of 20 to 65%.*

Licensee for Eastern States

THE FITZSIMONS COMPANY

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MONARCH STEEL COMPANY

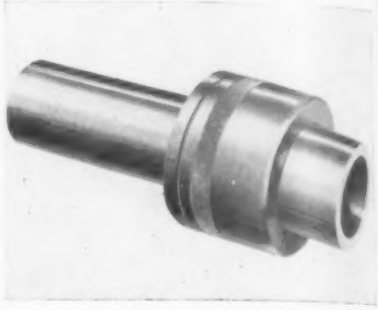
HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

tively in the slot in the shank, providing not only positive pulling, but also a positive radial positioning of the broach. When inserted into the pull head, the broach will be automatically connected, and can be released at any time by pushing the cross pin with the thumb and forefinger. For automatic release, a plunger, just above the bore which receives the broach, contains an adjusting screw which releases the cross pulling pin on the return stroke of the broaching machine.

FLOATING TOOL HOLDER CORRECTS MISALIGNMENT (N30)

More perfect correction of misalignment, both off-center and out-of-parallel, is claimed for a new floating tool holder announced by Empire Tool Co.



Floating Tool Holder

Being made of only five component parts, the moving parts riding on rollers so placed as to effect a perfect self-adjustment of the float in any direction, the holder is said to ream holes with close tolerances to absolute size and perfect roundness.

The rollers also help to make the members anti-friction and to produce smoother running, according to the company. Also, the possibility of making bell-mouthed holes is eliminated, and use of the tool reduces maintenance to a minimum, since there are no parts to fall out or get lost when the holder is taken apart.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

GRINDING WHEELS BALANCED QUICKLY WITH NEW KIT (N31)

Quick accurate balancing of grinding wheels is possible with a newly introduced balancing kit according to the manufacturer, the Pope Machinery Corp.

The kit consists of a wheel holder, stand, and arbor. The wheel is assembled in the balancing kit and the light side of the wheel marked, while the wheel is at rest. This indicates the direction toward which the weights on the wheel holder are to be set.

The wheel assembly is then mounted on the bench block which is part of the kit, and the weights adjusted toward the chalk mark, after which the assembly is put on the balancing stand again. If the chalk mark, indicating the light part of the wheel, moves up or down,

(Continued on page 182)

SOUTH BEND LATHES

BUY
WAR
BONDS

ARMY E NAVY

War production demands uniform accuracy. Loss of time or the waste of scarce strategic materials because of variations in machining cannot be tolerated. There is no place in our war production plan for equipment that cannot be relied upon to maintain required tolerances.

Sound design and careful workmanship give South Bend Lathes the dependable precision that assures uniform accuracy. Built by skilled craftsmen who take pride in their work, they are capable of maintaining split-thousandth tolerances on all work within their capacity. Their unvarying performance speeds production on the most exacting machine operations and assures perfect interchangeability of parts and units.

There is a South Bend Lathe for most war production requirements. The Engine Lathes are made in 9″, 10″, 13″, 14½″, and 16″ swings, with bed lengths from 3′ to 12′. The Toolroom Lathes are made in 10″, 13″, 14½″, and 16″ swings, with bed lengths from 3′ to 8′. The Turret Lathes are made in 9″ and 10″ swings, with 3½′ bed lengths. These lathes are described in Catalog 100C which will be sent upon request.

SOUTH BEND LATHE WORKS

SOUTH BEND 22, INDIANA • LATHE BUILDERS FOR 37 YEARS

WOOD & SPENCER

Woody Spencer says:

"We are maintaining the standards of quality and precision that have established WOOD & SPENCER as a leader in the manufacture of fine taps. When next you order taps, specify WOOD & SPENCER.

Write for our latest catalog."

"THE RIGHT TAP AT THE RIGHT TIME"

The Wood & Spencer Company

Cleveland 3, Ohio

Wheel Balancing Kit

weights are shifted to bring it into perfect balance. Once a wheel and holder are balanced, the wheel should not be loosened in the holder, since the balance will be lost.

INFORMATION FREE

For complete information on equipment listed in this section, list the key number preceding each item and your name and address on postcard coupons—page 163.

CEMENTED CARBIDE FILES SPEED PRODUCTION (N32)

A new type hard, high strength cemented carbide file has been introduced by Kennametal, Inc.

Inset shows portion of filing surface actual size, unretouched.

High Strength Carbide File

According to the company, lathes have been speeded up to speeds necessary for efficient, enduring performance of carbide-tipped cutting tools, and the ability to file revolving work pieces without reducing speed is a valuable aid to production. Service trials indicate that this file will permit filing speeds of 3 to 10 times that possible with steel files and that the corresponding increase of life is from 50 to 200 times. It will cut steels of a hardness up to 62 Rockwell C and also will do satisfactory work on cast iron and brass at surface speeds around 900 feet per minute. High-carbon, high-chromium steels have been filed at 800 s.f.m., with files still in good condition after three weeks' use.

THE END

JOHNSON FURNACES

Now

DELIVERED IN ONE WEEK

JOHNSON NO. 130-A

Hi-Speed Steel Heat - Treating Furnace

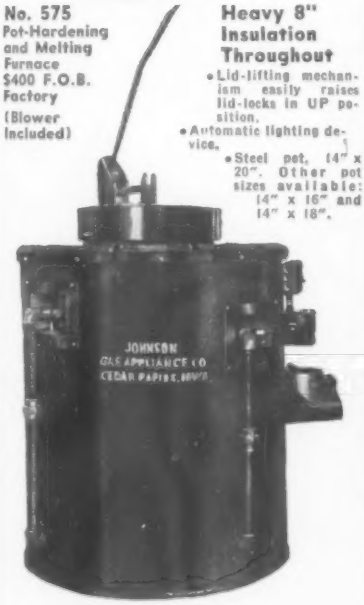
4-burner unit, shown, 1400 to 2000°F., priced at $295. 6-burner unit for 1800 to 2400°F., priced at $325. Counterbalanced door opens upward, so tools can be placed or removed without fully opening door—thus preventing temperature drops. Firebox 7" x 13" x 16". Heavily insulated.

Write for full facts. Prices are F.O.B. Factory.

No. 575
Pot-Hardening and Melting Furnace
$400 F.O.B. Factory
(Blower Included)

Heavy 8" Insulation Throughout

- Lid-lifting mechanism easily raises lid-locks in UP position.
- Automatic lighting device.
- Steel pot, 14" x 20". Other pot sizes available: 14" x 16" and 14" x 18".

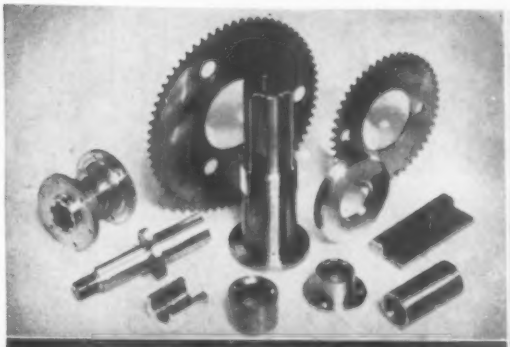


OFFICES

120 Liberty St., New York 6, N. Y.
Bourse Bldg., Philadelphia

WRITE for Catalog of all Johnson Gas Appliances

JOHNSON GAS APPLIANCE CO.
625 E Ave. NW., Cedar Rapids, Iowa



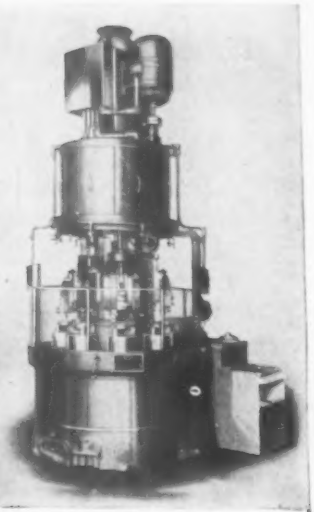
Leading machine-tool builders protect you against failure at critical points . . .

— with parts of wear-resisting

Ampco Metal

Check for this protection, when you look at the specifications of machines you buy — for you know that the name "Ampco" stands for longer life, several times that of ordinary bronzes. This remarkable alloy of the aluminum bronze class has been adopted by over 90 leading machine-tool makers — where they need exceptional strength, hardness, or resistance to wear, shock, and fatigue. Be sure you get it on new machines — replace worn parts of your older machines with durable Ampco. Write for catalog.

Ampco Metal, Inc.
Department TE-3 Milwaukee 4, Wisconsin



Ampco Metal Parts in the Bullard Mult-Au-Matic
Bullard machines, built by The Bullard Company of Bridgeport, Connecticut, include over 60 different parts of Ampco Metal — a mark of progressive engineering.

Reg. U. S. Pat. Off.
AMPCO
Metal
The Metal without an Equal

FOR today's war contracts and tomorrow's conversion . . . depend on Atlas machine tools to produce more parts at lower cost. The Atlas lathe, easily equipped for precision screw machine work, is typical of the operating efficiency, accuracy and dependability of these modern compact tools. Use Atlas for ALL small parts work . . . release larger machines for bigger jobs. Send for details. Atlas Press Co., 314 N. Pitcher St., Kalamazoo 13D, Mich.

Atlas F-SERIES 10" LATHE

Swing Over Bed	10¼"
Swing Over Carriage	6⅝"
16 Spindle Speeds	28 to 2073 RPM
Thread Cutting Range	4 to 96 per inch
Four Bed Lengths	18" to 36" centers

Atlas 4 TOOL TEAM FOR SMALL-PARTS MACHINING

NEW LITERATURE

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

OF INTEREST TO PRODUCTION EXECUTIVES

(975) Arc Welding

C. E. Phillips Co. has issued a 12 page illustrated booklet entitled **4 Ways to Salvage, Reclaim, and Conserve Iron Castings by Electric Arc Welding.** The book deals with difficulties encountered in arc welding cast iron, and points out that there is no single welding material or procedure which can be recommended as a universal practice. It describes four kinds of electrodes for use on cast iron and the characteristics and welding procedures for each.

(976) Ball Bearings

Service Procedure for Ball Bearings. This booklet, published by New Departure Division of General Motors Corp., gives in simple form all steps of handling bearings when overhauling equipment from dismounting, cleaning, and judging condition, to remounting. The book is well illustrated with drawings and photographs.

(977) Carbide Cutting

Covering the characteristics of different grades of carbide designed for steel cutting, selection of proper rake and relief angles, size of radius, and similar problems, a vest pocket booklet has been issued by Carboloy Co., Inc. Also included are considerations of machine requirements, speeds and feeds, grades recommended for different classes of steel, design and grinding of chip breakers, and operating hints for use of carbide tools. Of particular interest are trouble shooting suggestions to be followed in case of tool chatter.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(978) Hole Punching

Designated as **Brochure PS,** a publication illustrating and describing the Wales plate set system has been announced by Wales Strippit Corp. It outlines features of the Walesite plate sets and Wales PS punch assemblies and dies, said by the company to be the latest development in hole punching technique.

(979) Metal Duplicating

Die-less Duplicating. O'Neil-Irwin Mfg. Co. This catalog designated as **No. 44-6** deals with the Di-Acro system of metal duplicating without dies. It also describes and illustrates various models of Di-Acro benders, shears and brakes. In addition it describes the engineering service offered by the company.

(980) Engineering

Acme School of Die Design Engineering at South Bend, Indiana has issued a new catalog. It describes complete course in dies, tools, jigs, fixtures, and gages, and contains information about the curriculum, personnel, and physical facilities.

(981) Milling & Grinding

Cincinnati Milling and Grinding Machines, Inc., has just published its third yearly edition of its general catalog, listing the Cincinnati line of machines for milling, broaching, grinding, lapping, and cutter sharpening. The new publication has been considerably improved, and contains information on two additional machines and two pages of grinding machine attachment data.

(982) Metallurgy

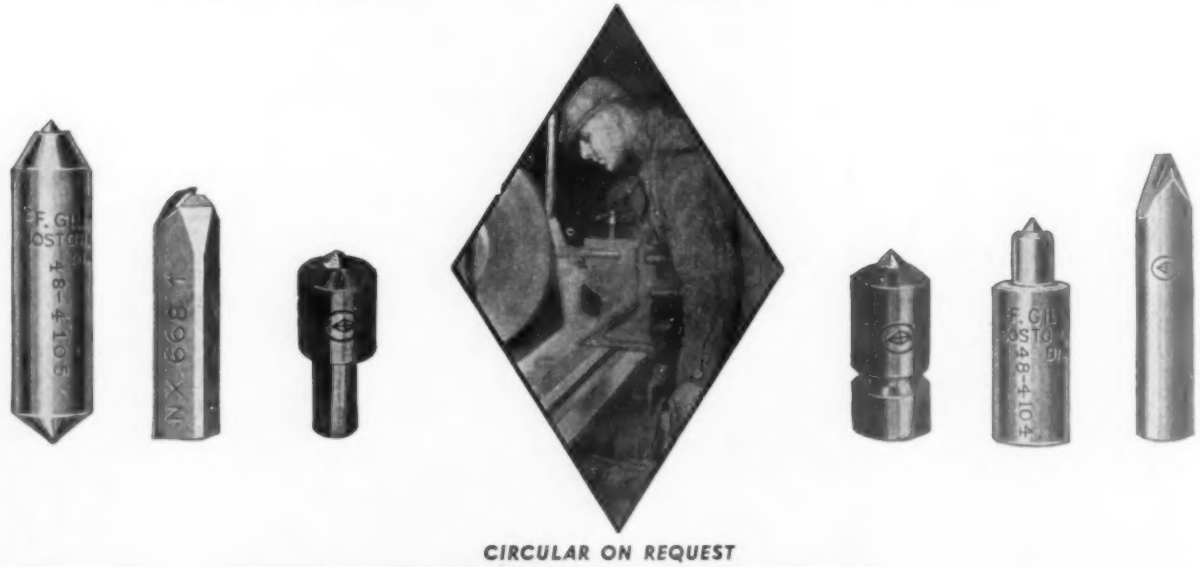
Powder Metallurgy. 32 pages. Keystone Carbon Co. Inc. Covering the

(Continued on page 186)

In Precision Grinding

one of the essentials to success is

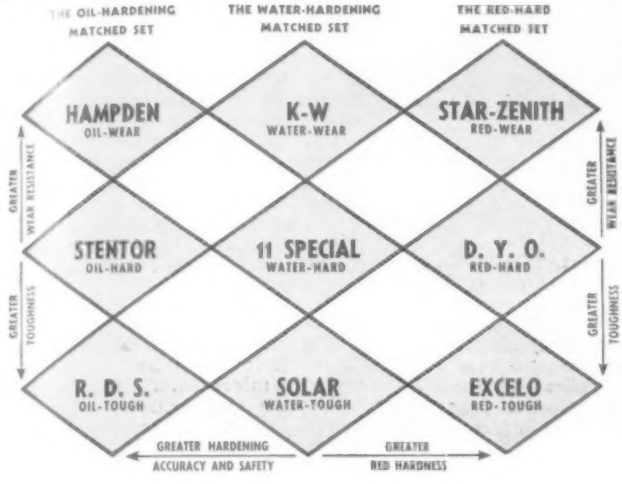
GILMORE DIAMOND TOOLS



CIRCULAR ON REQUEST

F. F. GILMORE & CO. 285 COLUMBUS AVE. BOSTON 16, MASS.

How this DIAGRAM *can help you . . .*



Get Better Tools . . . . That Increase Machine Output

If someone offered you a *tried and proved* method for selecting the right tool steel for each job—and told you how to simplify heat treatment and get better tools—you would probably hire him on the spot.

And that is just how the Carpenter Matched Set Method of selecting tool steel can be put to work in your plant.

In hundreds of plants, this tried and proved method is leading the way to tools that stay on their jobs longer, keeping machines operating more hours per month. It is reducing the number of times that tools must be reground, repaired and replaced. And simplified heat treating methods help you protect the hours that have gone into tool making.

To find out how you can put the Matched Set Method to work in your tool room, ask for your copy of the Carpenter Matched Tool Steel Manual shown here. It will point the way to better tools that can increase output from machines and presses. For your copy, drop us a line on your company letterhead.

The Carpenter Steel Company—**122 W. Bern Street • Reading, Pa.**

Here's your key to:

- **saving time and steel in the tool room**
- **getting better heat treating results**
- **increasing production per month per press**

In this 167-page *Matched Tool Steel Manual* you will find an alphabetical Tool Index and Steel Selector. At a glance, it quickly points the way to selecting the right tool steel for each job. Whether you need an oil-hardening, water-hardening or red-hard tool steel for the job, this Manual provides a definite system for arriving at the correct answer. And from there, it is a simple matter to follow the complete heat treating instructions.

The *Matched Tool Steel Manual* is offered free to tool steel users in the U. S. A., so for your copy write us a note on your company letterhead today.

Carpenter MATCHED TOOL STEELS

advantages and latest applications of powdered metal parts, this publication is of interest to companies investigating the possibilities and advantages of parts produced by this method. It includes a section on designers' aids, and a table on engineering properties. A section also is devoted to the company's porous bronze bearings.

(983) Thread Milling Cutter

A 16 page, 2-color, technical manual designated as Bulletin HT-43 and dealing with faster, more accurate sharpening of thread-milling cutters, gear hobs and similar tools, has been published by Detroit Tap & Tool Co. It includes tables of equivalent offset distances for all angles of rake, and for all sizes of cutters, and suggestions on setups, grinding, hook, lead, and flute spacing checking, prevention of run-out and other errors in sharpening of thread-milling cutters.

(984) Abrasive Milling

Andrew C. Campbell Div., American Chain & Cable Co., Inc., has issued a new catalog giving data and specifications of its 302 Wet Abrasive Cutting Machine. A typical job is described in detail, with key points illustrated.

(985) Thread Grinding

Thread Grinding Simplified, 6 pages. The Dumore Co. This 2-color instructional bulletin is clearly illustrated to show thread grinding operations. It includes samples of thread grinding done by the Dumore method, wheel dressing, and the six simple steps required to mount a Dumore No. 5 Toolpost Grinder and the thread grinder attachment to a lathe in preparation for thread grinding.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(986) Dust Collector

Edward Blake Co. has issued a 4-page 2-color illustrated folder describing its new No. 2 Filtaire portable dust collector. It contains a complete description of the unit together with a list of specifications.

(987) Sheaves

Magic-Grip Sheaves. Allis-Chalmers Mfg. Co. Designated as **Bulletin B6310,** this bulletin discusses the Magic-Grip Sheave made by the company. It contains a sequence of six photographs which demonstrate the "put-on" "take-off" operations for the sheave and a sketch of how it is locked to the shaft to provide smooth-running performance.

(988) Coolant Pumps

Ruthman Machinery Co. has issued a new 60-page catalog, tab-indexed according to sections, describing its coolant pumps. It describes each of seven different types or accessories on gusher coolant pumps—immersed type; outside mounted, pipe connected; outside flange mounted type, external discharge; outside flange mounted, internal discharge; belt driven models; shaft driven type; plain drive attachments; mounting brackets, and coolant tanks.

(989) Plastics

Containing information on all types of plastics, their uses, and general information on the plastics industry, a new 24-page, non-technical booklet, "Facts About Plastics," has been published by The Richardson Co. It covers the two main groupings of plastics—thermosetting and thermoplastic—and devotes special sections to forms of plastics, laminated and molded. The book is designed primarily to furnish information for the non-technical man, who may be serving on his company's postwar product committee. Requests for this booklet must be on a company letterhead.

(990) Chain Drive

Wartime Care of Chain Belt Drives. Chain Belt Company. This booklet includes information on maintenance, lubrication and repair of chain belt drives. It also discusses lubrication of low, medium, and high speed drives, chain slack, alignment, inspection, emergency measures, and chain drive storage.

(991) Metal Working Machinery

DoAll Products. DoAll Service Co. This illustrated book briefly defines the products manufactured by

(Continued on page 188)

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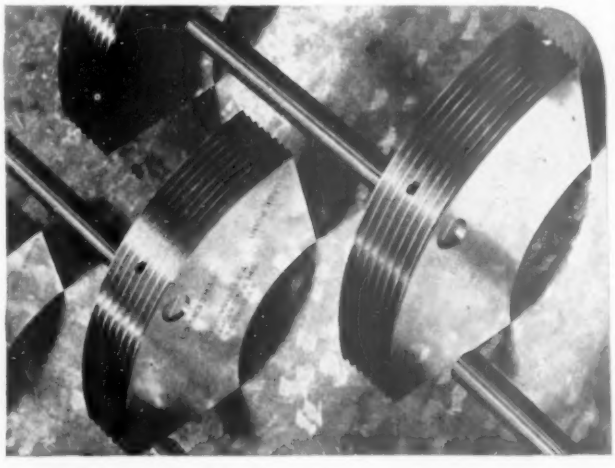

These special segment thread gages, are examples of the wide variety of thread, plug, and ring gages being regularly produced in our plant. Designed by our staff of engineers and manufactured to specified tolerances, they represent the highest skill and craftsmanship. The same high standards apply to special tools, fixtures, machines and parts, produced singly or in volume on contract. Our facilities and equipment are equal to the finest in the country. Write for literature describing these special engineering and manufacturing services, and our line of standard gages, carried in stock for prompt shipment.

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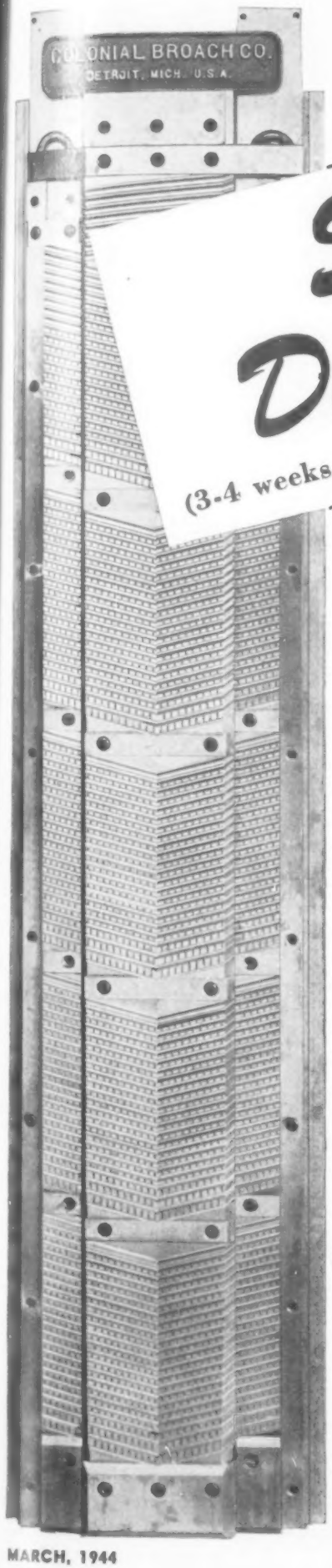

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Continental Machines, Inc., The Savage Tool Co., The Speedmaster Co., File Bands, Inc., Contour Saws, Inc., The DoAll Co. and Alloy Metals Division. It contains information on contour and high speed sawing and filing machines, saw and file bands, coolant oils and lubricants, precision surface grinders, gage blocks and gage inspection sets, variable speed drives, hydraulic presses, alloy metal mills, and free courses offered at the DoAll Trade School.

(992) Welding

The Eutectic Welder. Eutectic Welding Alloys Co., Inc. This monthly publication will be devoted to welding news, design, metallurgy methods, cost analysis, useful tools, and helpful hints. Requests for the publication must be on a company letterhead.

(993) Tapping

A new 4-page bulletin presenting facts about Kaufman tapping machines has been issued by L. J. Kaufman Mfg. Co. It includes information and illustrations of single and dual spindle tappers, special machines and fixtures, specifications, principle of operation, and special features of the machine.

(994) Electronics

General Electric Co. has issued a new 12-page bulletin indicated as **GEA-4126** dealing in fundamentals and various applications of electronic control. It explains clearly fundamental principles of electronic tubes and their operation and lists the functions of eight of the more widely used industrial-type tubes. It describes and illustrates many practical applications of electronic control, including resistance welding, and timing and processing operations.

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

(995) Thread Gages

Republic Gage Co. has just issued a new catalog containing information and charts of all phases of thread and cylindrical gages. The book is well illustrated.

(996) Carbide Tools

Tungsten Carbide Tool Co. has announced a new four-page stock tool bulletin, designated as No. 44-1, covering its revised line of single-point diamond-ground carbide tools.

It includes six styles of single-point tools, of which four are available in both left and right hand types, including offset tools. Also included are complete specifications and a list of prices, which are sharply reduced under those prevailing in 1943.

(997) Stellite Tools

Entitled **Operating Information on Stellite 98M2 Cobalt - Chromium-Tungsten Turning and Boring Tools and Milling Cutters,** a new publication has been announced by Haynes Stellite Co.

Intended to help users obtain best results with 98M2, the booklet explains the cutting angles, speeds and feeds, chip-breaker grinds, and grinding wheels that are recommended for use with Stellite turning and boring tools and milling cutter blades.

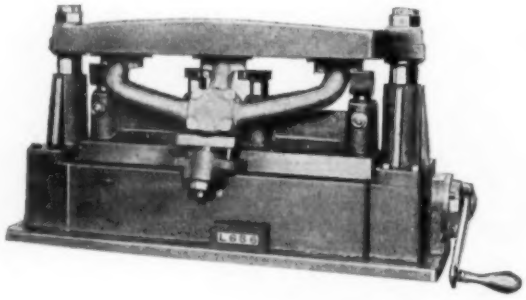
Also included are illustrations of two chip-breaker grinds and a list of grinding wheel recommendations.

NEW BOOKS

Blueprint Reading. 141 pages, $2.00. Published by D. VanNostrand Co., Inc. Written by Fred Nicholson, mechanical drawing instructor, Henry Ford Trade School, and Fred Jones, head of the drawing department, Ford Motor Co. Apprentice School, the book deals with fundamentals of blueprints and shop procedure.

It aims to acquaint the student with shop practice by lavish use of illustrations, accompanied by adequate text material. The main body of the work consists of 50 lessons and blueprints for study. In many of the lessons, pictorial drawings are included in addition to the working drawing in order to enable the student to visualize the object shown on the working drawing.

To help students who are handicapped by inadequate mathematical education, a brief review of arithmetic is included in the book.



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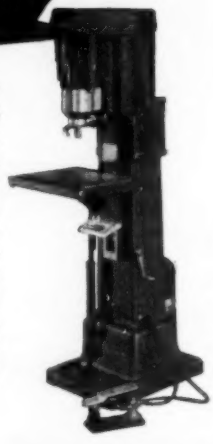

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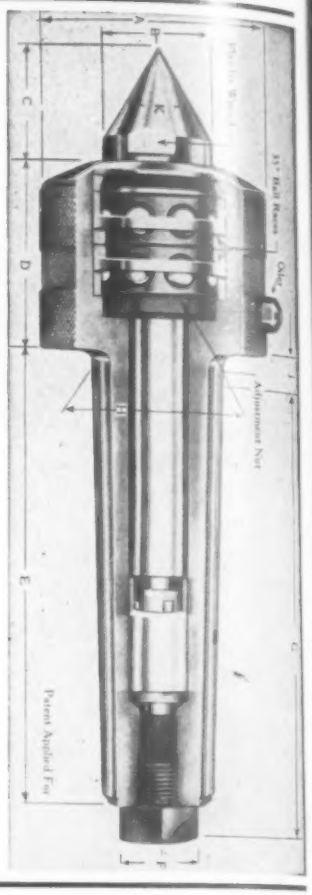

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The slide may be adjusted up and down on the pedestal and the dial indicator may be swung on the rod clamped in the slide, to indicate on any vertical, horizontal, or sloping surface. The vee base also has flat feet so it may be set firmly on a plane or cylindrical surface.

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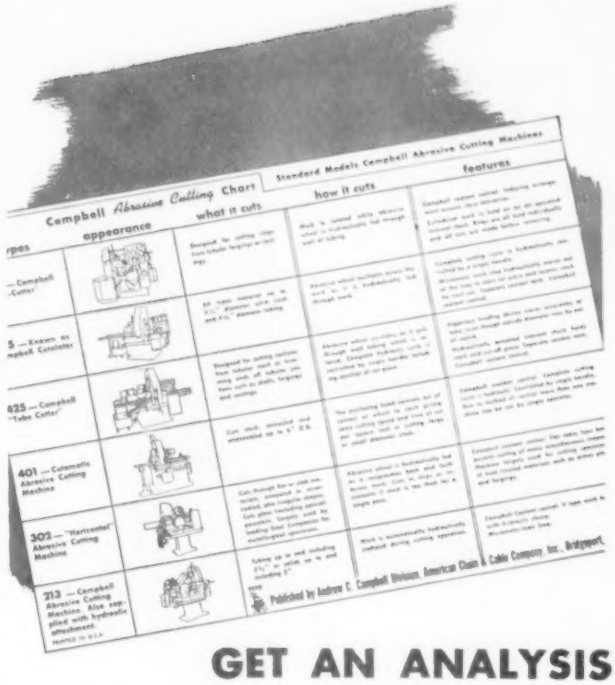
Campbell Abrasive Cutting Chart
Standard Models Campbell Abrasive Cutting Machines
appearance
what it cuts
how it cuts
features
401 — Cutomatic Abrasive Cutting Machine
302 — "Horizontal" Abrasive Cutting Machine
213 — Campbell Abrasive Cutting Machine. Also supplied with hydraulic attachment.
Published by Andrew C. Campbell Division, American Chain & Cable Company, Inc., Bridgeport, Conn.

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—*without obligation*

Based on the actual production records of the CAMPBELL complete range—the only complete range—of Abrasive Cutting Machines, Campbell engineers will gladly work up cost sheets and production procedures for your cutting. • All you need do is state the materials, shapes and sizes you are cutting, lengths before cutting, lengths of cut-off pieces and production required per hour. • The schedules given you will be practical and attainable. They will be based on the performance of some one of the 8 types and 19 models of CAMPBELL Abrasive Cutting Machines that are currently cutting all grades of steel, annealed and unannealed, non-ferrous alloys, plastics, glass and ceramics—solid bars, tubular and flat stock. • Ask for a copy of the chart shown above, too. It will give you fundamental information on the possibilities of abrasive cutting.

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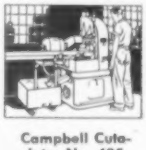

Campbell Cutalator No. 425
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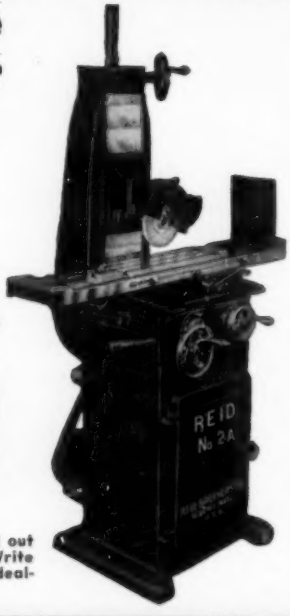

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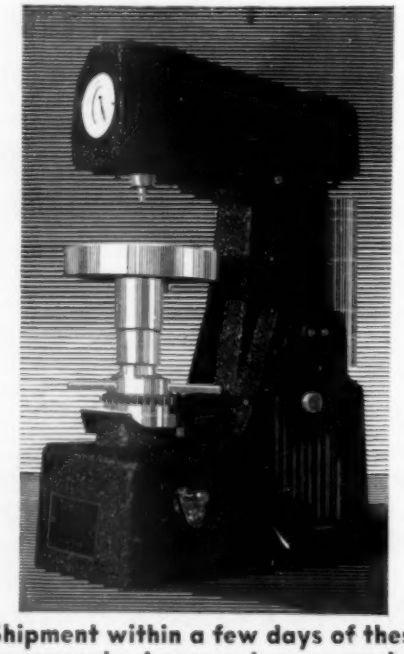

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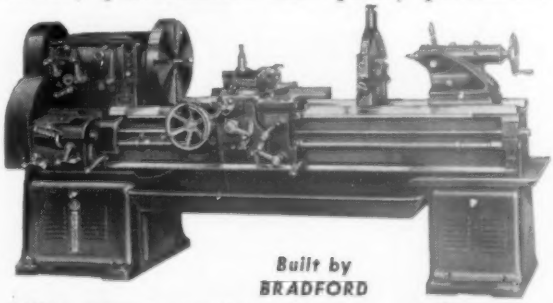

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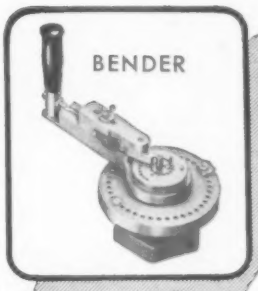

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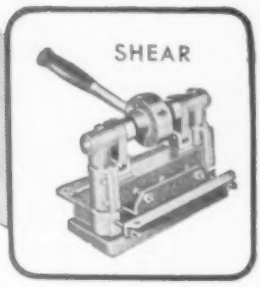

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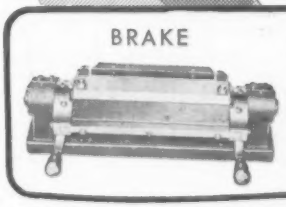
"DIE-LESS" DUPLICATING

might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines—Shears, Brakes, Benders—when used as a continuous, integrated production process.

The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided, deliveries speeded up.



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ROTARY PILOT BUSHING

Pilot bushing fits with a PUSH fit, therefore a perfect bore

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AS A WATCH

GATO Rotary jig and pilot bushing is built for core drilling, diamond boring, turret tool piloting, piloting hollow mills, line reaming, carbide boring, spot facing, etc.

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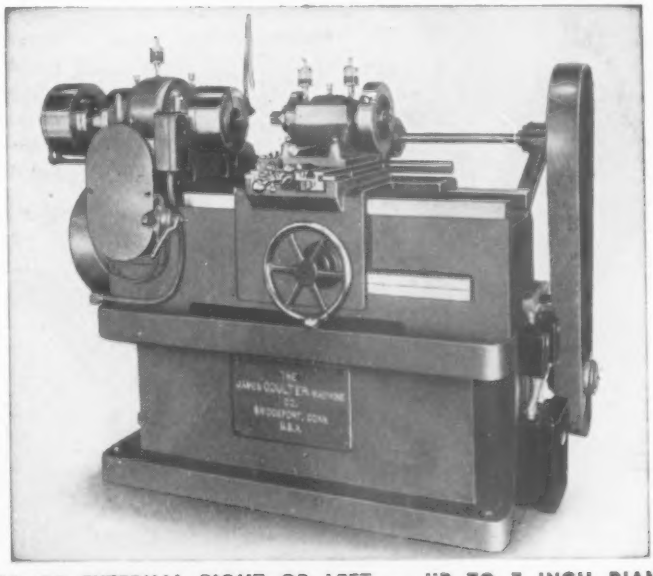
FULL AUTOMATIC CONTROL



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COMPLETE MOTOR EQUIPMENT — FIXTURE TO SUIT

The James COULTER Machine Co.
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HANDY ANDY *Says*—

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

A few days hence, as time flies, we'll meet in Philadelphia, where A. S. T. E. technical sessions will broaden knowledge and where the spirit of Benjamin Franklin will infuse us with wisdom. It will be good to be with the boys again, especially since, like the most of you, I've been too busy for anything but the most casual contacts during the past six months.

Twice, my trail should have crossed that of Ray Morris, but either he was indisposed or I was. Anyway, Ray has given more time to the Society than most men could afford, but at least, he has the satisfaction of having done a swell job. So has Doug Burnside, immediate successor to the presidency, and Clete Briner, next in line. Floyd Eaton, too (I see him, occasionally), has been doing a good job, all of which bears out my contention for close selectivity of our executive committee.

▲ ▲ ▲

Well, a good idea grows and grows, but, like a Victory garden, it takes lots of cultivation. Remember, you Ol' Timers, when the A. S. T. E. was a local, with the officers working into the sma'hours to push it along? As sec'y of Detroit Chapter (but that was after we'd jumped state lines) I would be at H. Q. until 3, mimeographing letters and licking stamps until I oozed gum arabic.

Frank Crone would be in one corner, poring over his accounts, and smiling Ray Brunner, then Nat'l Sec'y, would be hard at work in another. Others would come in to help: young Emil Fabbro (he eloped with our ass't. sec'y), E. R. DeLuiz, Hoffman, Joe Siegel, Bill Smila and others who gave of their time and toil that the Society might grow and prosper.

▲ ▲ ▲

Then, on the Standards Committee, we'd be at it in Al Sargent's office, going over forms, checking data, writing sales letters, and fighting against the (at first) discouraging resistance of prospects who, in the final analysis, shared the benefits of tool and machine standardization with the sponsor. Besides some of the boys mentioned above, (Bill Smila was com'tee ch'man at the time) there would be Frank Gertiser and Herb Wilbraham, Bert Carpenter and Ot Winter, Joe De Montigny and—oh gosh, I can't begin to recall them all.

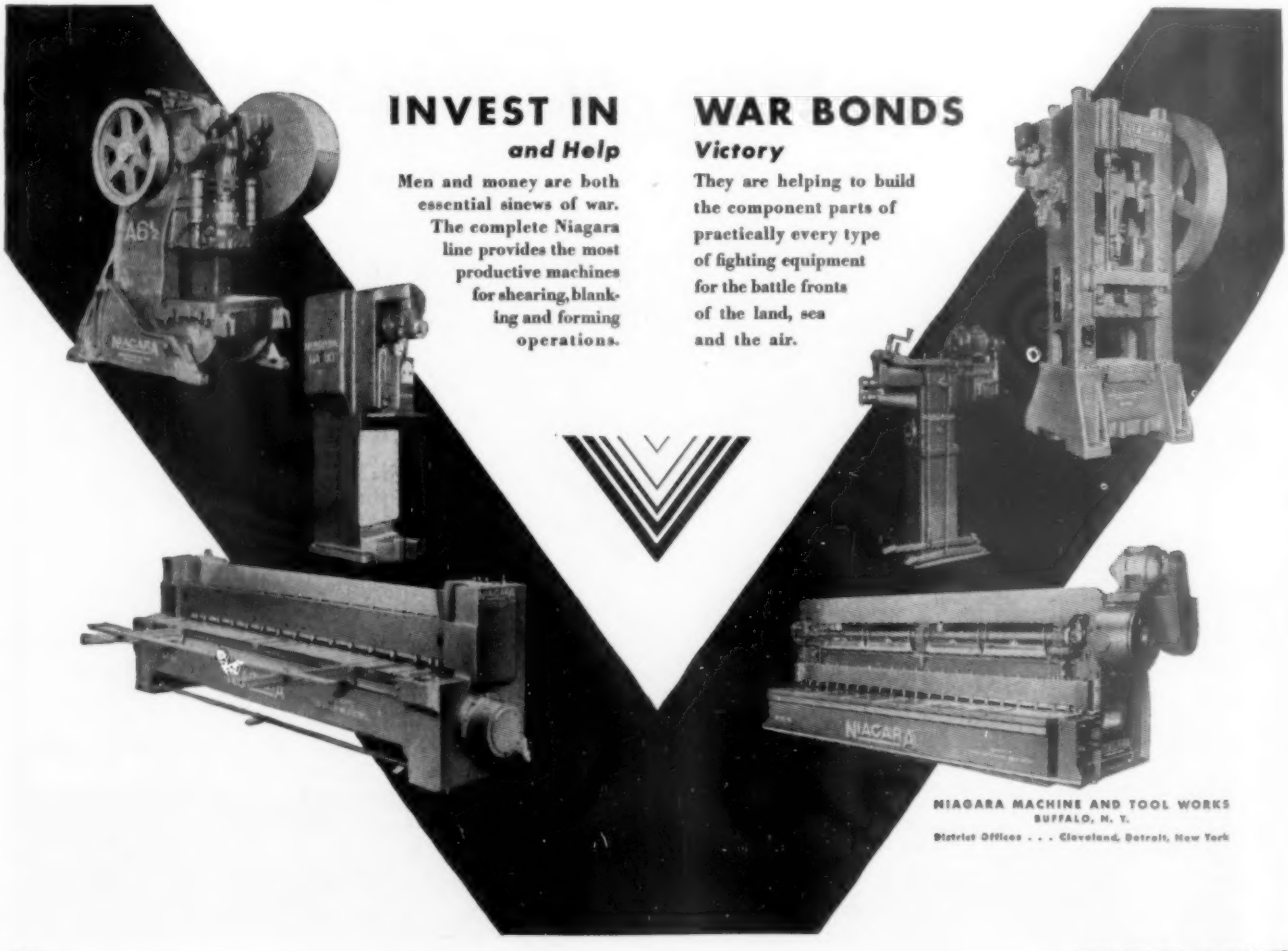
But I do recall the night that, responding to kidding about Swedish punch, I brought in a couple of bottles. Deceived by its mildness, some of the boys downed a tumblerful apiece, later wondered if they'd been kicked by a mule. I believe that I finally re-dictated the letters; knowing its potency, I had taken but the prescribed thimbleful. Yep, them were the days when we really got to know the milkman.

▲ ▲ ▲

Well, we branched out, and new faces came into the picture, an array of talent that taxes my memory (I'll never make a politician) and the space allotted me. But, there was Pop Hiatt and Gene Bouton from Racine way, Jack Hawkey, Rudy Fintz and Paul Zerkle from Cleveland, Eldred Rutzen Larry Radermacher from Milwaukee; these, with George Smart, made up the early "nationals".

By April, '37 (by then, The Tool Engineer was ⅛" thick!) Floyd Petteys, Bridgeport, Creager of Chi, and d'Arcambal of Hartford were on the scene, as was Jim Weaver of Pittsburgh. Ed Dickett and Clif Ives came along, as did George Keller and John Bartek; Nils Lou, Herb Hall and Ed Doogan; Don Reep and Al Mitchell, of the microscopic eye, and so on.

(Continued on page 196)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Men and money are both essential sinews of war. The complete Niagara line provides the most productive machines for shearing, blanking and forming operations.
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They are helping to build the component parts of practically every type of fighting equipment for the battle fronts of the land, sea and the air.
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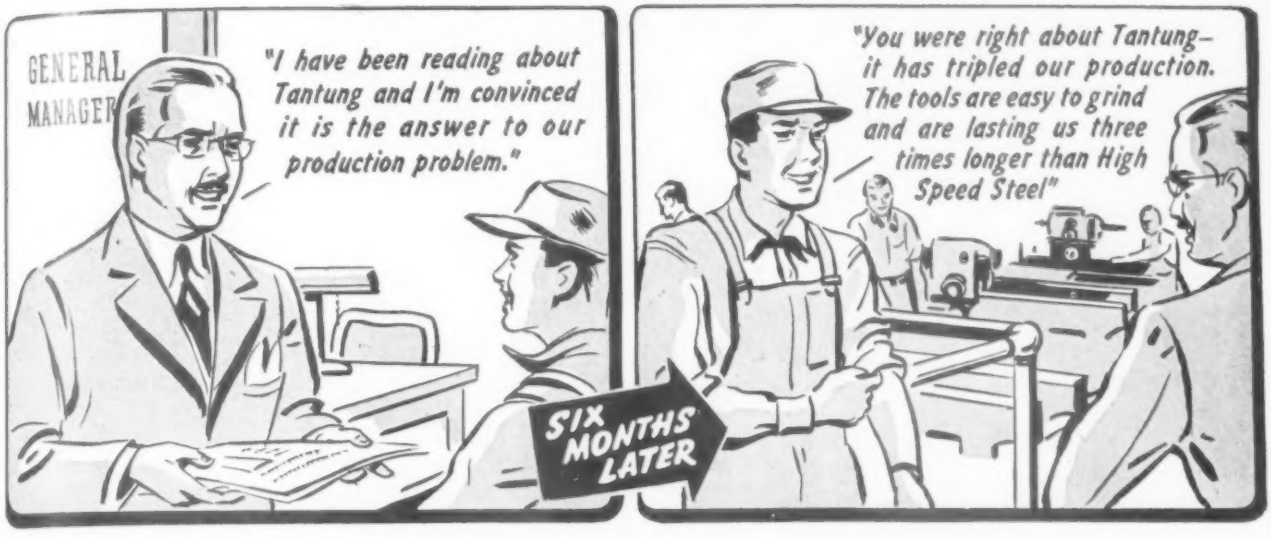
Only TANTUNG Could Have Done This!


GENERAL MANAGER
"I have been reading about Tantung and I'm convinced it is the answer to our production problem."
SIX MONTHS LATER
"You were right about Tantung—it has tripled our production. The tools are easy to grind and are lasting us three times longer than High Speed Steel"

This "Miracle Tool Metal" is establishing amazing records. It operates at highest efficiency between 90 and 190 surface feet per minute and "Fills the Gap" between conventional High Speed Steel and Cemented Carbides.

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Read a few of the many voluntary endorsements sent us by enthusiastic users of TANTUNG:

"We turn out so much more work with Tantung and cannot afford to use high speed steel."
—By an aircraft parts manufacturer

"We find that Tantung Tool Bits not only hold an edge about three times longer than the best high speed steel, but we can put our spindle up to practically the same speed as carbides." *—By a die casting manufacturer*

"Tantung Tool Bits and Tips are giving us excellent service and we are very much pleased with the increased production we are getting from their use."
—By a cast iron pipe manufacturer

"We have found Tantung Tool Bits satisfactory in every way and in a good many cases, we have more than tripled our production over the regular high speed steel tool bits." *—By a pump manufacturer*

"To date, we have purchased approximately 15,000 Tantung Tools; and as production increases, our purchases of these tools will probably increase accordingly."
—By an aircraft engine manufacturer

"Since using Tantung on stainless steel and other tough alloy jobs, we would not think of changing Tantung Tools for any other tool on the market." *—By a key manufacturer*

TANTUNG is a non-ferrous cast alloy that cuts rolled, forged or cast steel, annealed or heat treated, and any material that can be machined. Operates at greater speeds, heavier cuts, heavier feeds, produces more pieces per grind and insures better finish than high-speed steel tools!

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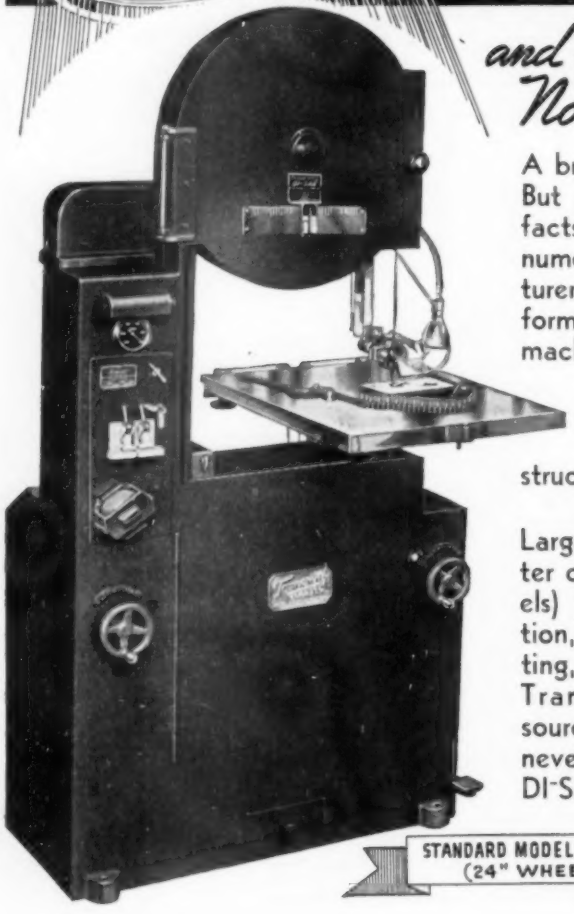

A broad statement? Yes. But soundly founded on facts—the experience of numerous large manufacturers — the actual performance records of the machines, themselves — and fundamental superiorities of design and construction.

Larger wheels (24" diameter on the standard models) provide greater traction, faster, straighter cutting, more production. Transmissions, common source of die saw grief, never fail in TANNEWITZ DI-SAWS.

STANDARD MODEL No. M24
(24" WHEELS)

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On request: Bulletins on Single and Variable Speed Foundry Band Saws; Sheet Metal Cutting Band Saws.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.

—HANDY ANDY SAYS—

(Continued from page 194)

We got to gallivantin' around, to Cinci via special train, to Cleveland via boat. That was when Dan Karpinsky threw down a straight flush a/e he had to run to the rail. To Toledo, where Sec'y Sherman's (I hope I got the name right) little girls danced for us. They must be debs by now. Then to Pittsburgh, where the Hounds started a bonepile that somehow moldered to dust.

It was Pittsburgh's Jim Weaver who, as Director, innocently proposed a tool exhibit in connection with the '38 Annual, a motion which I as innocently seconded. And look what we started! Had we failed!—but let's not go into the harrowing details of the months that preceded the Show. It went over, and so did the A. S. T. E.

▲ ▲ ▲

Of the Ol' Timers of the early days many are still plugging along; Lee Diamond, Ray Farmer, Bill Fors, George Whitehouse, John Lindegren, Slim McClellan. And I hear occasionally from later arrivals; Rip Collins of Texas, Art Denis from the Coast, Len Singer of Canada. (In that connection, isn't it about time we had a Canadian V. P? And Montreal would be a swell place for a Convention. I'm telling you!)

▲ ▲ ▲

Yep, a grand gang of men, and I've only mentioned a few that popped readily to mind. Yet, of all these names, one stands out because he gave so much—Al Sargent, our first Nat'l Sec'y. It was Al's driving force that largely spurred the Society on during the early days. Not that he did it all—everybody worked, those days—but, Al gave us quarters, rent free, when we didn't have the proverbial loving cup in reverse. He furnished light, heat, and stenographic service, and, as I know from first hand observation, sacrificed time sorely needed for his business to boost the A. S. T. E. along.

I had him in mind when, in the February issue, I said that kings are inclined to forget. Not that Al has suffered from neglect; rather, his Pioneer organization has grown to huge proportions since he relinquished Society activities for his own affairs.

▲ ▲ ▲

But, he was a strong man in the formative days of the A. S. T. E., and has won an enviable reputation in the engineering and business world. The amazing thing, to me, is that he hasn't been called to the fore at a time when the Society's interests demand strong men in the Executive Committee. This is no disparagement of any incumbent (I have personally given these my full support) nor of any potential "dark horses"—and I think I know 'em all. I speak, as a member, for the good of the Order.

Perhaps it is not my province to suggest an Executive slate, yet, I take pride in the fact that, of all the men whom I have personally sponsored, not one has failed to vindicate my judgment. Wanting nothing for myself, either as regards office or honors, I feel free to speak my mind. Anyway, here's a tip for the Nominating Committee.

THE END

with

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SWISS TYPE AUTOMATICS

and their various attachments

In addition to normal turning and forming operations

The No. 2 Wickman machine illustrated is equipped with both three-spindle and slotting attachments. Three other attachments for drilling, threading and taper turning are also supplied for this machine. All Wickman attachments are easily interchangeable.

Do you manufacture parts which are in any way similar to those illustrated above—which require any of the operations listed? Are you interested in holding production runs of those parts to tolerances of ± .0005″ or closer and securing finishes as fine as 25 micro-inches? If your answers to these two questions are in the affirmative, Wickman Swiss Type Automatics have a place in your production.

Two Swiss Type Automatics are produced by Wickman. The No. 2 machine shown above has a ½″ bar capacity and will handle pieces up to 4″ long. The No. 1 machine has 5/32″ bar capacity, maximum length capacity of 1 9/16″.

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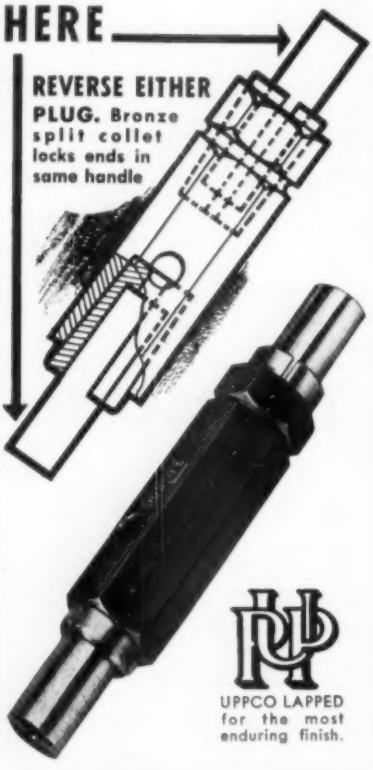

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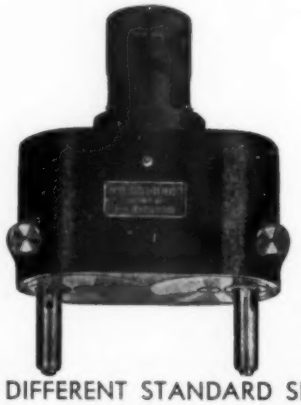

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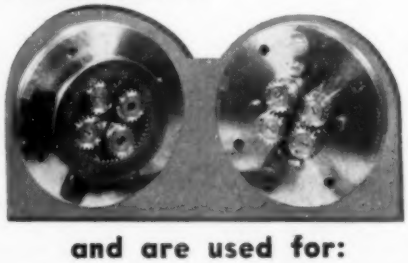

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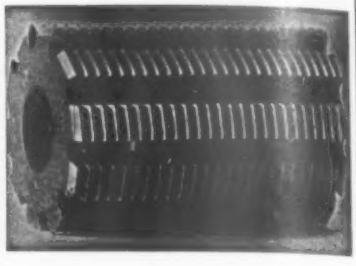

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	3 flute		X			
	4 flute	(X)	(X)	(X)	(X)	(X)
1/4-28	2 flute	X	X	X	X	
	3 flute					
	4 flute	(X)	(X)	(X)	(X)	X
5/16-18	2 flute		X			
	3 flute					
	4 flute	(X)	(X)	(X)	(X)	(X)
5/16-24	2 flute					
	3 flute					
	4 flute	X	X	(X)		
3/8-16	3 flute					
	4 flute	(X)	(X)	(X)		
3/8-24	3 flute					
	4 flute	X	X	(X)		
7/16-14	3 flute					
	4 flute	X	(X)	(X)	(X)	
7/16-20	3 flute					
	4 flute	X	X	(X)	(X)	
1/2-13	3 flute					
	4 flute	(X)	(X)	(X)	(X)	(X)
1/2-20	3 flute				X	
	4 flute	(X)	(X)	(X)	(X)	(X)

SIZE		PG 01	PG 1	PG 2	Comml Grnd	Cut Thr
9/16-12	4 flute	X	(X)	(X)	(X)	
9/16-18	4 flute	X	X	X	X	X
5/8 -11	4 flute	X	(X)	(X)	(X)	(X)
5/8 -18	4 flute	X	(X)	(X)	(X)	(X)
11/16-11	4 flute					
11/16-16	4 flute					
3/4						
		X	X	X	X	X
3/8-6	4 flute					
3/8-12	4 flute					
1/2-6	4 flute				X	X
1/2-12	4 flute					

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SIZE	PG 01	PG 1	PG 2	Comml Grnd	Cut Thr
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1/4-28 2 flute	(X)	X	X	(X)	
5/16-18 2 flute	(X)	(X)	X	X	X
5/16-24 2 flute	X	X	(X)	(X)	X
3/8-16 3 flute	X	(X)	(X)	(X)	X
3/8-24 3 flute	X	X	X	X	X

SIZE	PG 01	PG 1	PG 2	Comml Grnd	Cut Thr
7/16-14 3 flute	X	(X)	(X)	(X)	
7/16-20 3 flute	X	X	(X)	(X)	X
1/2-13 3 flute	X	X	X	X	
1/2-20 3 flute	X	(X)	(X)	(X)	

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• National Headquarters of the American Society of Tool Engineers: 2567 West Grand Boulevard, Detroit 8, Michigan. Telephone, TYler 5-0145. National Officers (term of 1943-1944): President, Ray H. Morris; 1st Vice-President, Douglas D. Burnside; 2nd Vice-President, C. V. Briner; Secretary, Earl V. Johnson; Treasurer, Floyd W. Eaton; Executive Secretary, Adrian L. Potter.

• For application blanks and information pertaining to membership in the American Society of Tool Engineers, address the Secretary's office, 2567 West Grand Boulevard, Detroit 8, Michigan. Senior initiation fee is five dollars. Dues, eight dollars per year for senior grade membership, and five dollars per year for junior grade membership. Junior initiation fee is two dollars.

Atlanta: Approximately 50 members attended the closed meeting held Feb. 2 at the W. P. Childs Machinery Co.

New officers elected are: Chairman—Cliff Brownell; vice-chairman, Jack Childs; 2nd vice-chairman, Jim McDonald; secretary, Jim Borom, and treasurer, Matt Otey. Following the election two films were shown.

Binghamton: At the Feb. 2 meeting held at the Sherwood Hotel, Greene, N. Y., the following officers were elected for the coming year: Chairman, Roland Barratt, Sr.; 1st vice-chairman, Floyd Tilton; 2nd vice-chairman, Albert Pangburn; secretary, Gottfried Riesen, and treasurer, William Mazar.

The technical speaker was E. I. Rivkin, representing Molina Diamond Co. His talk, "Diamonds and Their Application to Industry," covered the finding, manufacturing, and processing of diamonds for industrial use.

Boston: Officers elected at the Feb. 10 meeting held at Schrafft's Restaurant are: Chairman, Henry Richards; 1st vice-chairman, Arthur A. Nichols; 2nd vice-chairman, Jack Savits; secretary, Frank Copp, and treasurer, Standish Rowe.

Technical speaker was Lieut.-Commander Waugh who made an "off-the-record" address. It was announced that the American Society of Metals has extended the chapter an invitation to attend its Mar. 16 meeting, at which J. F. Lincoln will speak.

Chicago: Next season's officers presented by the nominating committee at the Feb. 7 meeting at Huyler's Restaurant are: Chairman, J. R. Miller; 1st vice-chairman, F. A. Armstrong; 2nd vice-chairman, H. R. Nelson; secretary, F. J. Schmitt, and treasurer, H. M. Taylor.

The technical subject, "Light Waves and Their Use in Shop Measurements," was presented by Adam Gabriel, vice-president in charge of production of the Acme Industrial Co. His talk, illustrated by slides, covered the development of techniques in the use of light waves for measuring to millionths of an inch.

Cincinnati: Over 100 persons attended a joint meeting of A. S. T. E. and the American Welding Society, held Feb. 8 at Hotel Alms.

Technical speaker was M. W. Schultz, welding supervisor, of L. & N. Railroad, Louisville, Ky. He talked on "Welding as Applied to the Railroad Industry." Also on the program was an interesting talk and movies on "Bessemer & Research," presented by R. N. McGee of Jones & Laughlin Steel Corp.

Kansas City chapter's booth at war show in that city tells of tool engineers' contribution to war effort.

Cleveland: William "Bill" Jack of Jack & Heintz, Inc., was speaker at the February meeting in the Hotel Hollenden. Attendance of approximately 325 persons made the meeting the largest in the chapter's history.

Mr. Jack was accompanied by his partner Ralph Heintz, and one of his associates, "Bill" Tabb, both of whom gave short talks. Also on the program was the showing of a March of Time film depicting production methods employed at the Jack & Heintz plant.

Officers elected at the meeting were: Chairman, Karl Meyer; 1st vice-chairman, J. I. Karash; 2nd vice-chairman, (no majority reached); treasurer, R. I. Miller, and secretary, Warren Fitzsimmons.

Also on the program was the showing of a War Department film portraying German and Japanese war production, fortifications, and war effort.

Columbus: Earl Johnson, National A. S. T. E. secretary, gave a short talk on the coming Annual Convention at Philadelphia at the Feb. 8 meeting held in the Green Room of the Hotel Fort Hayes.

Officers elected are: Chairman, H. T. Spoerlein; 1st-vice chairman, Howard Volz; 2nd-vice chairman, Walter Bock; secretary, C. W. Warner, and treasurer, W. K. Armagost.

Friz Mackey, assistant football coach at Ohio State University showed official pictures of the Ohio State vs. Illinois football game.

Dayton: In elections held at the Feb. 14 meeting at the Engineers' Club, the following officers were elected: Chairman, Walter Olt; 1st vice-chairman, George Tillotson; 2nd vice-chairman, John Meyer; secretary, George Bollman, and treasurer, Adam Lensch.

Technical speaker was K. T. Kuck, chief engineer of Monarch Machine Tool Co. He introduced several guest speakers from Robbins & Myers, Inc., who talked on the Moyno Pump and its problems of tooling. Mr. Kuck concluded the session by showing several films on machining glass moulds with intricate designs.

Detroit: Elections were the chief order of business at the Feb. 10 closed meeting held at the Wardell-Sheraton Hotel. Newly elected officials are: Chairman, Grant S. Wilcox, Jr.; 1st vice-chairman, E. Wayne Kay; 2nd vice-chairman, W. B. McClellan; secretary, John Allmon, and treasurer, Andrew Carnegie.

Principal technical speaker at the session was William H. McCoy, master mechanic, Aircraft Div., Packard Motor Car Co. He spoke on "Tooling and Production of the Rolls-Royce Engine." His talk covered the transposition of original drawings to present production manufacture of the engine. He illustrated his discussion with slides. Also on the program were a movie by Federal Products Corp. on the use and applications of Dial Type Indicators, and a talk by Lt.-Col. Louis Kanaar, chief of aircraft machine tool procurement at Wright Field.

Elmira: At the Feb. 7 meeting celebrating the chapter's fifth anniversary, officers were elected for 1944.

Those elected were: Chairman, George N. Morceau; 1st vice-chairman, Karl C. Schmedicke; 2nd vice-chairman, William C. Veitch; secretary, Albert Coe,

(Continued on page 202)

HARDINGE Precision Collets
for all makes of Lathes and Milling Machines
HARDINGE
ELMIRA, N.Y.
Style "B" Master Feed Fingers and Pads
HARDINGE Precision Collets and Feed Fingers for
all makes of Automatics, Turret Lathes and Chucking Machines
Style "S" Sure Grip
Master Collets and Pads
"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

and treasurer, Lester Trew.

Technical speaker at the meeting was R. A. Cole, experimental engineer for the Norton Co., who spoke on "Surface Finish Measurements." The address was illustrated with slides. The program was completed by showing of the picture, "Monarchs of the Ring."

Erie: At the Feb. 1, meeting held at General Electric Co. Community Center, the following officers were elected: Chairman, J. C. Wilcox; 1st vice-chairman, C. O. Bennett; 2nd vice-chairman, H. D. Gage; secretary, H. E. Spencer; and treasurer, H. W. Hagle.

Following the election, George Burns, metallurgical engineer from the Vanadium Alloys Steel Co., talked on the composition, treatment, and selection of tool steels for specific tooling problems.

At the March 7 meeting, C. B. Price, district sales manager, and Herbert J. Griffing, machine tool engineer, both of the Norton Company, were speakers. They talked on "Grinding Wheels" and "How the Machine Tool Will Help to Solve Post-War Problems."

Coffee speaker was Hugh A. Platt, plant superintendent of Lord Manufacturing Company.

Fairfield County: Officers elected at the Feb. 2 meeting at the Algonquin Club were: Chairman, A. S. Curry; 1st vice-chairman, Carl B. Christensen; 2nd vice-chairman, Charles Gluck; secretary, Francis W. Bulmer; treasurer, T. J. Keating, and assistant secretary, S. R. Duguay.

Technical speaker was Malcolm F. Judkins, chief engineer of Firth-Sterling Steel Co., who talked on "The Design, Manufacture and Use of Firthite Sintered Carbide Tipped Tools." Nearly 100 persons attended the technical session.

Fond du Lac: William Felten, Sheboygan, was elected to succeed Arthur E. Schroeder, Oshkosh, as chairman of the chapter during the coming year at the Feb. 11 meeting at the Hotel Retlaw.

Other new chapter officers elected are: 1st vice-chairman, Gideon Kane; 2nd vice-chairman, George E. West; treasurer, Jule P. Schommer, and secretary, E. J. Kaiser.

Several chapter guests from Milwaukee, Manitowoc, Sheboygan, and Oshkosh, attended the technical sessions on "Plastics."

Guest speaker was Winfield T. Cooper, research engineer of the Bakelite Corporation. He showed a sound movie depicting various processes, production, and machinery involved in making plastic articles.

Fort Wayne: Paul Weitzman was elected chapter chairman to succeed Cyril Grindrod at the Feb. 9 meeting held at the Chamber of Commerce.

Other officers elected at the meeting are : 1st vice-chairman, F. A. McGuire: 2nd vice-chairman, J. J. Joel; treasurer, Doyal White, and secretary, Milton Kline.

Golden Gate: Joseph C. Fletcher, San Francisco, was principal technical speaker at the joint meeting held in conjunction with the American Society of Mechanical Engineers at the Engineers' Club Jan. 6.

His talk on "Dial Indicators" was supported by two reels of sound film showing the progress that has been made in the use of dial indicators for inspection work. Also on the program was showing of a sound film "Army on Wheels."

Greater New York: J. H. Qwick and J. Kessler, industrial methods engineers for R. C. A. Mfg. Co. were principal speakers at the Feb. 7 meeting held in the Hotel New Yorker. They discussed "Tool Designing for Production."

Hamilton: At the Feb. 11 meeting held at the Royal Connaught Hotel, C. D. Wright, of The McKinnon Industries Ltd., St. Catherines, was principal speaker. His talk on "Gauging Systems" was ably presented, and supported with lantern slides.

Officers elected at the meeting are: Chairman, T. G. Fechnay; 1st vice-chairman, H. H. Whitehall; 2nd vice-chairman, J. M. Walton; secretary, K. R. Laidley, and treasurer, R. Young.

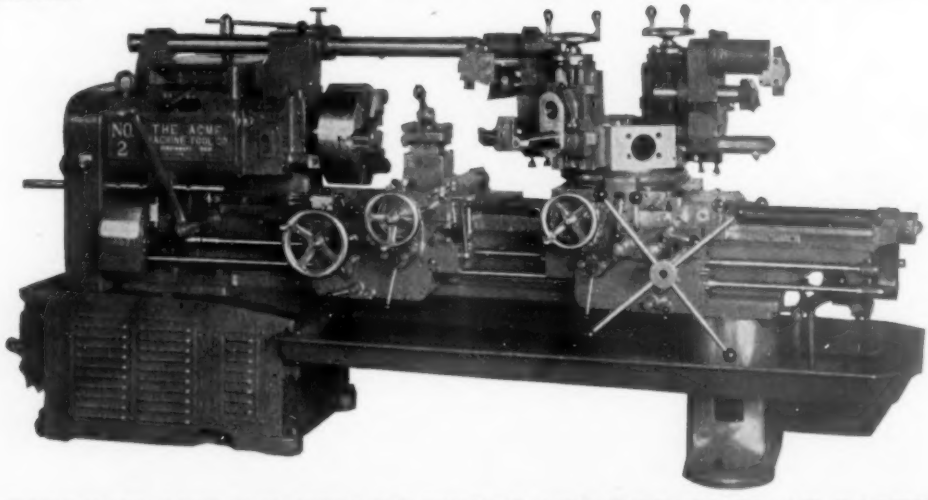
Hartford: Ninety-five members attended the closed meeting held at The City Club Feb. 7.

Officers elected for the ensuing year are: Chairman, Henry A. Rockwell; 1st vice-chairman, George A. High-

(Continued on page 204)

CINCINNATI
ACME
UNIVERSAL
TURRET LATHES

SPEED PRODUCTION--SAVE TIME



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The above illustrated No. 2 ACME Universal Turret Lathe with its stationary overhead pilot bar and headstock brackets together with rigid turret tooling permits heavy multiple cuts. These features assure accuracy while faster speeds are possible through the use of cemented carbide cutting tools. This machine features heavy duty multiple turning heads and vertical side tools and heavy duty reversible cutter holders. Also shown is the lead screw type chasing attachment with split nut brackets and threading dials on both carriages. • WRITE FOR COMPLETE DETAILS.

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One of Foredom's complete line of versatile utility grinding kits preferred by so many plants for emergency and maintenance needs. You too will find it pays to spot them liberally about your plant. Pencil-size handpiece facilities getting into tight corners for touching-up production set-ups.

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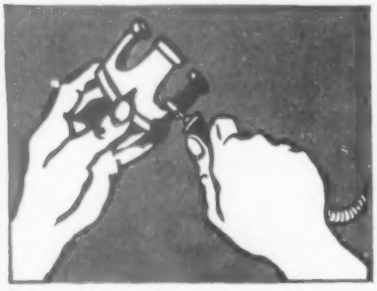
2 In die and tool departments, for grinding, finishing and touching up dies, molds, jigs, etc.



3 For de-burring, grinding, finishing, polishing and other light production jobs—particularly valuable on irregularly-shaped parts.

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berg; 2nd vice-chairman, Edmond Morancey; secretary, Joseph Balciunas, and treasurer, A. B. Lindstrom.

Houston: Chief technical speaker at the Jan. 18 meeting was B. T. McNeil, vice-president and general manager of McEvoy Company, who talked on the engineer's accomplishment during the war effort and called on all tool engineers to assume responsibilities for designing and building tools that would make for a sound post-war economy.

Also on the program were talks by H. B. Dannenbaum, chief engineer, Utilities Department, City of Houston, and H. E. Collins, past chairman, who gave a brief history of the A. S. T. E. and the progress the Society has made to date. He outlined national activities and discussed important roles tool engineers have played during the war effort.

Indianapolis: A record attendance of 175 made the Feb. 3 meeting the largest on record. The meeting was set aside for the election of officers.

The program included a sound motion picture film captured from the Germans and Japanese and provided by the War Department.

Kansas City: Coffee speaker at the Feb. 2 meeting, held at the Fred Harvey Pine Room in the Union Station, was Sgt. J. E. Barry, U. S. Marines. He gave an interesting talk of his experiences aboard the U. S. S. Lexington and U. S. S. York, and described the results of the efforts of tool engineers on the home front.

Officers elected at the meeting are: Chairman, A. J. Mirick; 1st vice-chairman, Wilber P. Peterson; 2nd vice-chairman, H. Robert Brown; treasurer, Leroy F. Campbell, and secretary, James E. Bell, Jr.

Retiring chairman W. W. Mason was honored as the person responsible—along with his employers, Black, Sivalls, and Bryson, Inc.—for organization of the local chapter.

Lakehead: D. R. Cooper was elected chairman for the coming year at the Feb. 3 meeting held at Legion Hall, Port Arthur, Ont. Other officers elected are: 1st vice-chairman, A. M. Woodside; 2nd vice-chairman, J. Murie; secretary, P. H. Spence, and treasurer, G. B. Stanbrook.

The technical subject, "Manufacture and Use of Carbide Tools in Steel Production," was handled by four chapter members. J. Murie outlined the history and advances of the manufacture of cemented carbides. F. Brunwin gave a clear picture of the use of carbide tools from a tooling angle; A. Baynham followed with a discussion on how carbide tools work in actual production and W. Proudman rounded out the discussion with a review of tool control.

Little Rhody: H. M. Huffman, field engineer of the Cincinnati Milling Machine Co., presented an illustrated lecture on "Cutter Grinding Technique" at the Jan. 31 meeting held at Wannamoisett Country Club.

His talk featured results with cutters properly ground as compared with those improperly ground. John Higgins presented a report with recommendations for study by members relative to affiliation with the Providence Engineering Society, with which local chapters of all national engineering societies are associated.

Los Angeles: The first stag party of the local chapter was held Jan. 25 at the Dude Ranch, North Long Beach, California. More than 300 members and guests attended.

Louisville: "Light Waves and Their Uses in Shop Measurements" was the subject of a talk given by Adam Gabriel of the Acme Industrial Co., Chicago, at the January meeting.

Mr. Gabriel has consented to having his name placed on the program list for use of other chapters. According to members who heard the talk, the discussion presents methods of light wave measurements to the tool engineer in such a manner that a good fundamental knowledge of the system can be obtained.

Milwaukee: Harry Gotberg, chief engineer in charge of design, Colonial Broach Co., was technical speaker at the Feb. 10 meeting held at the Astor Hotel. He spoke on broaches, their design, construction, and use. His talk was illustrated with lantern slides and movies.

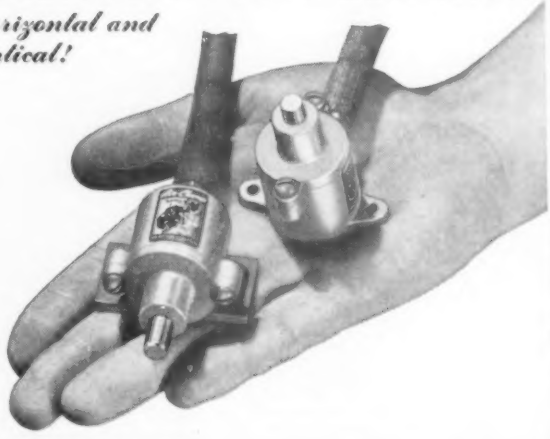
Officers elected at the meeting are:

(Continued on page 206)

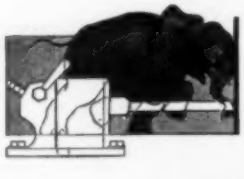
Announcing **MEAD**

MIDGET AIR CLAMPS

Horizontal and Vertical!



Both models deliver 80 lbs. pressure on a line pressure of 100 lbs. They'll save countless man-hours in assembly operations involving welding, riveting, bolting, etc. ***Advantages over mechanical clamps;*** 1. Any number can be operated by single master valve. 2. Easily installed in cramped corners. 3. Equal ram pressure at any stroke point. Send for new Mead AIR POWER Catalog, describing our line of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc.



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TECO Cemented Carbide is manufactured to rigidly controlled hardness, density and uniformity. Its unusual resistance to wear and breakage prolongs tool life. Cutting edges stay sharp longer — more pieces are produced per grind — less time lost for re-tooling.

This extra capacity of TECO Cemented Carbide, coupled with *the new low price*, makes it a most economical cutting material for high speed turning, boring and facing. Prompt, dependable delivery can be made on tools and blanks — in grades, styles and sizes for most machining needs. Have our engineering department make recommendations. Write for detailed catalog.

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TECO CEMENTED CARBIDE

Chairman, Foster Kuehn; 1st vice-chairman, Art Gieringer; 2nd vice-chairman, Ernst Collins; secretary, Roland Nauertz, and treasurer, Richard Ford.

Montreal: J. E. Donald Hastie, industrial education supervisor, Carborundum Company, was principal speaker at the Feb. 9 meeting held at the Windsor Hotel.

Mr. Hastie spoke on "Principles in Grinding". He also presented a 40-minute sound film completely illustrating this subject. The picture presents the creation of abrasives, grinding wheel components, grade, structure, cutting action and important types of grinding operations.

Also on the program was an address by H. W. Wallace, general manager of Wheel Trueing Tool Co. He gave an illustrated talk on "Industrial Diamonds and Their Application In Industry."

New Haven: M. J. Weldon was elected chairman of the chapter for the coming year at the Feb. 10 meeting held in the Duncan Hotel.

Other officers elected at the meeting were: 1st vice-chairman, Jack F. Sargent; 2nd vice-chairman and secretary, Frank A. Shute; and treasurer, Alton V. Pollard. At the technical session, A. H. d'Arcambal, past A. S. T. E. president introduced Dr. George Dubpernell, United Chromium, Inc. who gave an excellent talk on "Chromium Plating".

North Texas: George H. Sanborn, engineer for the Fellows Gear Shaper Co. was technical speaker at the Feb. 16 meeting, held at the Cactus Room of the Hotel Texas.

Mr. Sanborn talked on "Gears at War." Officers for the ensuing year also were elected at the meeting.

Peoria: At a closed meeting held at the Jefferson Hotel, Feb. 1, the following officers were elected: Chairman, J. O. Knight; 1st vice-chairman, E. M. Bertschi; 2nd vice-chairman, O. T. Wiesemann; secretary, E. R. Beck, and treasurer, J. T. Fischer.

Philadelphia: Charles S. Gotwals, supervisor of quality control and inspection, SKF Industries, Inc., was principal speaker at the "SKF Night" program held Feb. 17 at the Engineers' Club.

Mr. Gotwals spoke on "Quality Control at SKF." Also on the program was the showing of a sound color film "The Dial Indicator and Dial Indicator Gauges." The picture was shown through the courtesy of Edward R. Glenn, Federal Products Corp.

Pittsburgh: William (Bill) Jack, president of Jack & Heintz, Cleveland, was principal speaker at the Feb. 4 meeting, held at William Penn Hotel. He was introduced by C. V. Briner, national 2nd vice-president.

Mr. Jack told of the origin of his company, disclosing that some of the methods he uses were adapted from ideas that he had come across during a visit to Europe in 1936. He said his present set-up and organization calls for a humane attitude toward workers, respect for their personalities, promotion of a partnership feeling, provision for security, and elimination of fear.

Officers for the ensuing year were elected at the meeting. About 750 guests attended the dinner.

Potomac: Approximately 200 persons turned out to hear Frank W. Curtis, consulting engineer, Induction Heating Corp., who talked on "Application of Induction Heating for Hardening and Brazing" at the Jan. 6 meeting. Ernest M. Seifert, chairman, introduced Mr. Curtis, who is a past national president. A movie, "Baptism of Fire" concluded the program.

At the Feb. 3 meeting, S. M. Weckstein, chief engineer, Industrial Division, Timken Roller Bearing Co., spoke on "Application, Care and Maintenance of Tapered Roller Bearings in Machine Tool Equipment."

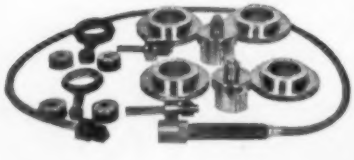
Coffee speaker was Bob Wilson, Fishing Editor, Washington Times-Herald. Also on the program was the showing of a movie, "Manufacture of Grinding Wheels," shown through the courtesy of the Carborundum Company.

Officers elected at the meeting for the coming year are: Chairman, Jay C. Reed; 1st vice-chairman, Lawrence Didszoneir; 2nd vice-chairman, Edmund R. Redfield; secretary, Richard P. Thayer, treasurer, Robert T. Plitt.

Rochester: Burton E. Middleton of

(Continued on page 208)

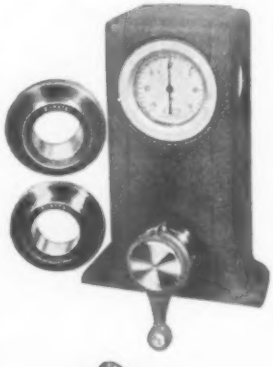
A HOLE CHECKER that operates by AIR

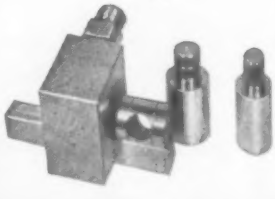


The American Hole Checker is an outstanding development with many important advantages for precision production:

- It utilizes a simple and efficient principle of air pressure and volume. Operates on air pressure as low as 50 lbs.
- It is quickly set by using high and low limit master ring gages. Sizing plugs are specially designed and made of hardened steel, ground and precision lapped.
- Simple and easy adjustment of high and low limits of tolerance on dial indicator. Can be calibrated to register .0001" or less.
- Checks holes without actually contacting inside surfaces. Eliminates possibility of scratching or damaging soft or burnished hole surfaces.
- Modern design, with all working parts enclosed. Flexible hose adaptor for checking work on fixed machines or where work is too heavy to handle.
- All sizing plugs and adaptors made to suit your requirements. Send your prints or sketches for quotations. Prompt deliveries assured.

Request Bulletin 43-TE for details. Also American Amplifying Gages, Thread Checkers, Radius Dressers, Bench Center and Lapping Plates. Designers and Builders of special Tools, Dies and Gages.





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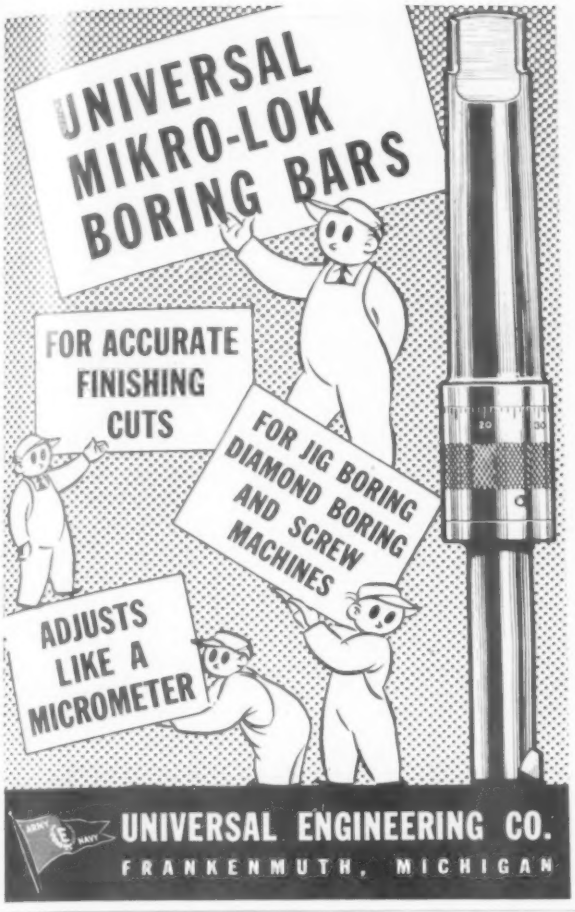

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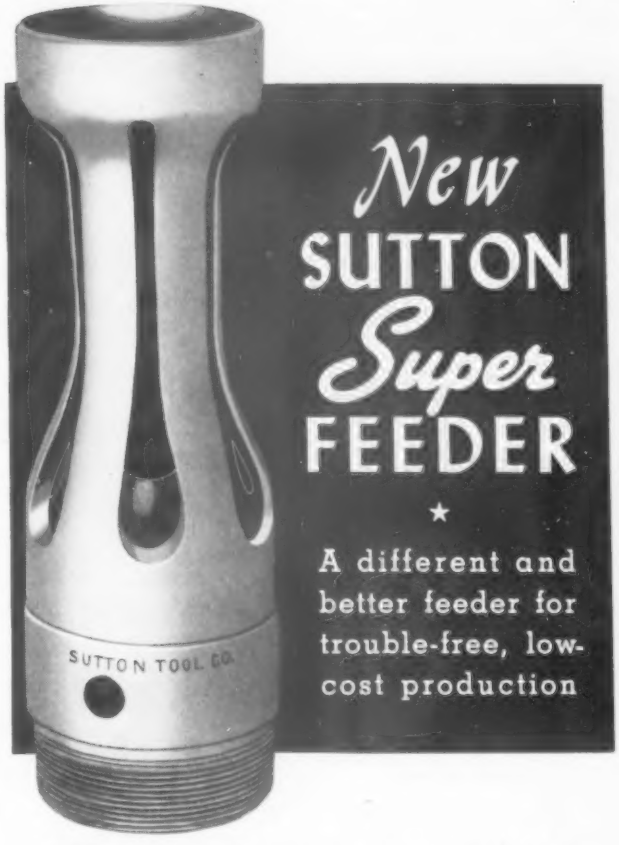
Model 1-P3 "V" Belt
The essential features are the same as motor-driven Gusher models, the only difference being the substitution of an automatically oiled gear-driven mechanism for the motor.
THE RUTHMAN MACHINERY CO.
1815 READING ROAD CINCINNATI 2, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS



DIFFERENT—because it grips stock with spring steel *in compression,* not in tension as in ordinary feeders.

DIFFERENT—because multiple springs exert equalized gripping pressure *directly* on stock.

BETTER—because multiple springs grip stock over a much larger area giving better, more uniform grip with less stock marring, less wear on feeder.

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ECONOMICAL—because a few hammer taps restore spring tension, giving longer tool life, lower tool cost.

Costs No More Than Ordinary Type Feeders

SUTTON TOOL CO. *2895 W. Grand Blvd Detroit 2, Michigan*

Kennametals, Inc., was technical speaker at the Jan. 11 meeting held in Strong Auditorium, University of Rochester.

His talk, "Carbide Cutting Tools," dealt with characteristics, design, and application of single-point carbide tools. The address was followed by two short movies showing the application of carbide tools in a number of airplane plants on the west coast.

Coffee speaker was H. Martin of the Todd Co., who talked on "Round Pegs in Round Holes." The address was based on various aptitude tests given prospective employees of the Todd Co. Frank O'Brien and George Codd were elected to the nominating committee.

Rockford: Leonard C. Grimshaw, metallurgist, and Ray P. Kells, chief service engineer, both from Latrobe Electric Steel Co., were speakers at the Feb. 3 meeting at the Faust Hotel.

Discussing factors affecting tool-failure, Mr. Grimshaw pointed out that abrupt changes in expansion and contraction encountered when steels pass the critical temperature point during heat treatment are responsible for many broken tools. He also described water, oil, and air hardening processes for steel. Mr. Kells showed a series of slides dealing with various stages of preparing steel for tools.

San Diego: G. H. Sanborn, representing The Fellows Gear Shaper Co., was principal speaker at the Feb. 11 meeting at the U. S. Grant Hotel. He spoke on "Gears At War," covering briefly the designing, manufacturing, and inspection of gears, including the most modern methods of producing gears of accuracy demanded for aircraft and instrument work.

Schenectady: Dr. H. A. Frommelt, research engineer, Kearney & Trecker Corp., spoke on "Plastics Engineering" at the Feb. 10 meeting held at R. W. Building, Watervliet Arsenal.

Dr. Frommelt, who has made an extensive study of plastics throughout industry, told of the tremendous strides achieved in this field and its possibilities for the future.

Seattle: Officers elected for the ensuing year at the Feb. 1 meeting are: Chairman C. Mattson; 1st vice-chairman, K. Bergerson; 2nd vice-chairman, W. Ainsworth; secretary, L. G. Gibson, and treasurer, Bill Mackay.

Technical speaker was G. E. Sanborn, Fellows Gear Shaper Co. After discussing "Gears At War", he showed a film entitled "Introduction of Gears", furnished by Shell Oil Co. It portrayed the first gears used by man, and showed subsequent stages through which gear production has progressed up to the present time.

South Bend: Sixty members and guests turned out to hear Lt. Kennan of the U. S. Navy Recruiting Office speak on Naval Officer Procurement at the Feb. 8 meeting.

Election of officers for 1944-45 was held with the following results: Chairman, A. V. Regan; 1st vice-chairman, F. S. Burnside; 2nd vice-chairman, P. W. Winkelmann; secretary, C. C. Stevason, and treasurer, S. Bojarski.

Technical speaker was L. E. Martz of Micromatic Hone Corp., who discussed the Hone Abrading Process and presented a sound motion picture to augment his talk.

St. Louis: Following the dinner and business meeting at the Hotel Melbourne Feb. 3, a joint meeting was held at the Engineers' Club at St. Louis, addressed by A. L. Hasty, Detroit district manager, Industrial Division, Sunnen Products Co.

He spoke on "Honing as a Method of Finishing Holes" and showed slides illustrating some of the wide variety of applications of honing. An informal discussion followed his talk.

Toledo: A joint technical session with the Toledo Section of The American Welding Society was held Feb. 9 at the Toledo Yacht Club.

W. J. Conley, consulting engineer for The Lincoln Electric Co., was technical speaker. He talked on "Welding of Jigs and Fixtures," illustrating his talk with slides. He advised the group to design fixtures using sections, requiring a minimum amount of welding. He also stated that "strain relieving" should rarely be used and careful attention given to cooling when it is used.

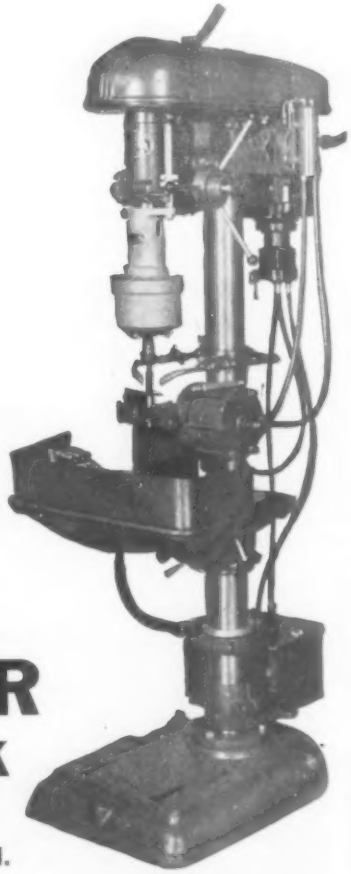
Following his address, several reels of film showing welding in different

(Continued on page 210)

have you a *TOUGH* TAPPING JOB?

Procunier Tapping Machines Have Licked Jobs That Have Stumped Experts . . . .

On numerous tapping jobs where unusual difficulties have been encountered — Procunier Tapping machines have succeeded where other means have failed. There are specific reasons for this superior performance of Procunier machines: 1. The improved Procunier tapping head with double-cone cork-face friction clutch and other exclusive features; 2. Four speeds, ranging from 390 to 2050 RPM. efficiently handle jobs for which conventional high speed tapping machines are inadequate; 3. One machine handles tap sizes from No. 2 to 1/2" through two interchangeable heads; 4. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing pressure INDEPENDENT OF OPERATOR.



Send for Bulletin—giving full details, description and prices on the Procunier Universal Tapping Machines, the Procunier Precision Tapping Heads and the new Tru-Grip Tap Holder.

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The high speed of electric motors can be stepped down economically with Cullman Speed Reducers to meet the requirements of the slower machine operations. They are made in single, double or quadruple reduction types for motors from ⅛ to 15 H.P. Ratio 1.65 to 1 to 1015 to 1.

Cullman Speed Reducers are compact, durable, and efficient. They are equipped with Roller Bearings, Helical Gears, Sprockets, and Roller Chains, all operating in oil. Motor mounting is easy, and when completed makes a single unit that simplifies machine installations. Write for complete information.

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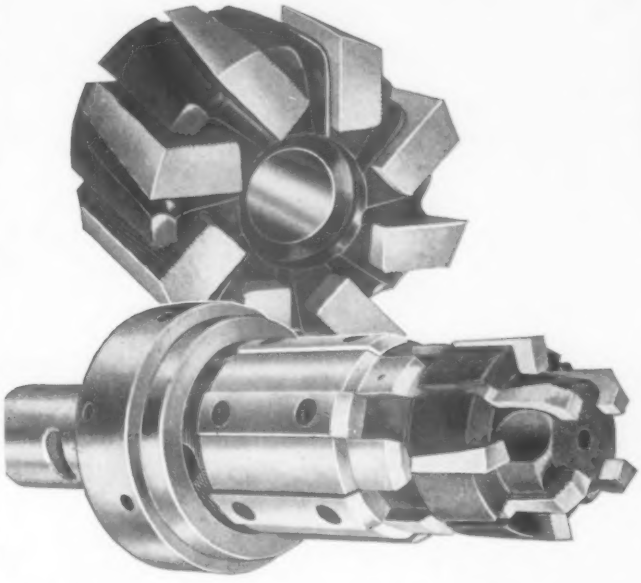

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These same O K Tools now "fighting" in thousands of metal working departments will be ready when the war ends to begin the important work of meeting peace time needs. The reason is that the only wearable parts are the cutting edges. These can be readily reground or renewed at small cost. Then the tool is back to full efficiency. The bodies and the standard bits and blades are a permanent investment.

Available in—

MILLING CUTTERS, END MILLS, FACE MILLS, BORING HEADS, REAMERS, COUNTER-BORES, and single-point tools for LATHES, SHAPERS, PLANERS, etc.

"O K" FOR EVERY METAL CUTTING JOB

THE O K TOOL CO., SHELTON, CONN.

TRADE O K MARK **SYSTEM**
OF INSERTED-BLADE METAL CUTTING TOOLS

Rawhide PROTECTS

C/R MALLETS AND HAMMERS

permit forceful effective blows without battering, scarring or marring. They protect fine finishes, delicate insulation, hardened parts and costly machinery. They far outlast other mallets, hold a true striking face and, because they absorb recoil, they are less fatiguing on continuous use operations (as pounding in winding, assembly work, etc.). Speed production—reduce spoilage. All sizes. Weighted or unweighted. Hammers take replaceable insert faces.

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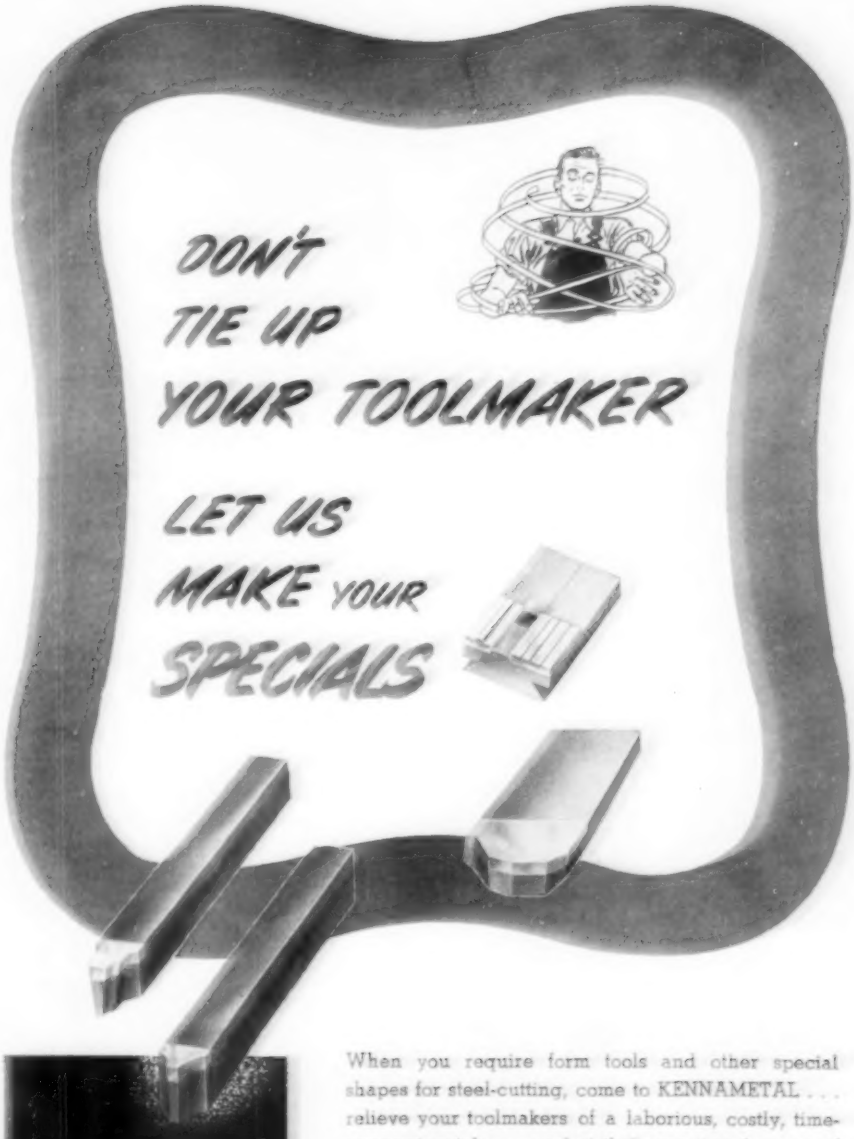
Replacement insert faces for C/R Hammers sold by leading supply houses.



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When you require form tools and other special shapes for steel-cutting, come to KENNAMETAL . . . relieve your toolmakers of a laborious, costly, time-consuming job . . . and at the same time be sure of highest degree of tool performance.

KENNAMETAL special tool service provides the facilities, experience, and skilled personnel that few, if any, machine shops have need for or can afford to maintain. By using this service you obtain the help of a staff of trained tool engineers, whose advice assures you of getting the right grade of KENNAMETAL, properly ground to accurate rake and cutting edge angles.

Next time you need "specials," give the job to KENNAMETAL specialists. Depending on requirements, we will economically and promptly supply either complete tools, or formed tips for brazing to shanks in your own shop. Our Catalog 43-C contains a wealth of information on KENNAMETAL tools for all steel-cutting purposes. Write for your copy.

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KENNAMETAL Inc.

600 LLOYD AVE., LATROBE, PA.

SUPERIOR CEMENTED CARBIDES

positions and atomic hydrogen welding were shown.

Toronto: Election of officers was an added feature at the February meeting. James B. McRae, formerly [illegible] vice-chairman, became [illegible] chairman. Other officers elected were [illegible] vice-chairman, Eric Grant, [illegible] vice-chairman, Walter [illegible] secretary, John Burke, [illegible] Charles Neal, Past chairman [illegible] were presented to Ed Barker and Norm Wearn by chairman Fred [illegible].

J. W. Cable, research engineer, Induction Heating Corp., spoke on induction heating at the technical session. He illustrated many [illegible] fixtures and interesting [illegible] and heating control examples.

Tri-Cities: At the Feb. 9 meeting held at the Blackhawk Hotel, Davenport, Iowa, Adam Gabriel of Acme Industrial Co. spoke on "Light Waves and Their Uses in Shop Measurements."

He discussed precision measurements with particular reference to the use of light waves, since the wave-length of light seems to be the one of the few definite quantities of length in the universe. He described the use of light waves in checking gages and precision parts, and discussed the necessary equipment, illustrating his talk with slides.

Twin-Cities: H. B. Whitlock of the Monsanto Chemical Co., was principal speaker at the Jan. 12 meeting in Minneapolis.

He talked on "Molds and Their Relation to Plastics." Also on the program was a talk by Mr. Moxness of the Minneapolis Honeywell Regulator Co., who outlined developments in "Transfer Molding of Phenolic Plastics." Following this talk, Mr. Heik of the Girdler Electric Co. spoke on electronic heating as applied to plastic molding. Approximately 75 members attended.

At the Feb. 16 meeting, Adam Gabriel, Acme Industrial Co., talked on "Light Waves and Their Uses in Shop Measurements."

Twin States: Principal speaker at the technical session at the Feb. 9 meeting, held in the Masonic Temple in Springfield, was H. M. Huffman, field engineer for Cincinnati Milling and Grinding Machine Co. He was introduced by Robert Gillette of Jones & Lamson Machine Co.

Mr. Huffman spoke on "Cutter Sharpening Practice," illustrating his address with slides. He talked on common problems in cutter grinding, such as tool room set-ups and types of wheels. He also discussed methods of preserving and reconditioning badly worn cutters.

Officers elected at the meeting are: Chairman, Ken Aiken; 1st vice-chairman, George Morin; 2nd vice-chairman, William Farrell; treasurer, Prescott Lovejoy; secretary, Raymond Streeter. Three war films were shown entitled "Battle of Midway," "Rendova & Munda" and "Baptism of Fire."

Wichita: Principal business of the Feb. 8 meeting, held at Droll's English Grill,

(Continued on page 212)

from simplest

DIES

to most exacting

•

GAUGES — TOOLS — FIXTURES
JIGS — SPECIAL MACHINES
DESIGNING & ENGINEERING
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Die & Tool Makers
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FOR INDUSTRIAL OIL PURIFYING
Specify HILCO
HYFLOW OIL FILTERS

HILCO Hyflow Oil Filters are used for filtering all types of industrial oils such as used for cutting and lubricating. Units are available for stationary use or portable operation for moving from one machine tool to another.

By keeping cutting and lubricating oils in good condition, oils are kept in service for an indefinite time and result in less down time, longer periods between tool grindings and better finished work. This means increased production.

★ Write today for free literature and see what Hilco operators are doing – then let us help you select a Hilco to take care of "That Particular Job."

OIL PURIFIER HEADQUARTERS

THE HILLIARD CORPORATION
107 W. FOURTH ST. ELMIRA, N. Y.

PATENT PENDING

Why
HERMAN PRECISION GRANITE
SURFACE PLATES
Offer Advantages Unsurpassed

Remember, these revolutionary Surface Plates are cut from solid blocks of natural granite, the ideal material for the exacting requirements of perfect surface plates. And here's why: First, HERMAN SURFACE PLATES are ***flat*** . . . accurate up to 1/10,000 inch overall. Then, they ***stay*** flat. No warping! Not affected by ordinary temperature changes! And no other plates can approach these PRECISION GRANITE Surface Plates in hardness . . . outwearing metal plates many times over. Smooth action, too! And non-abrasive, non-magnetic, non-corrosive!

Here's the greatest forward step in Surface Plate development in the past half century. Why not have all its benefits? Write or wire for descriptive circular!

HERE ARE A FEW:

- Flat, warp-proof
- Hard, precision surface
- Unapproached accuracy
- Amazingly long life
- Non-essential material

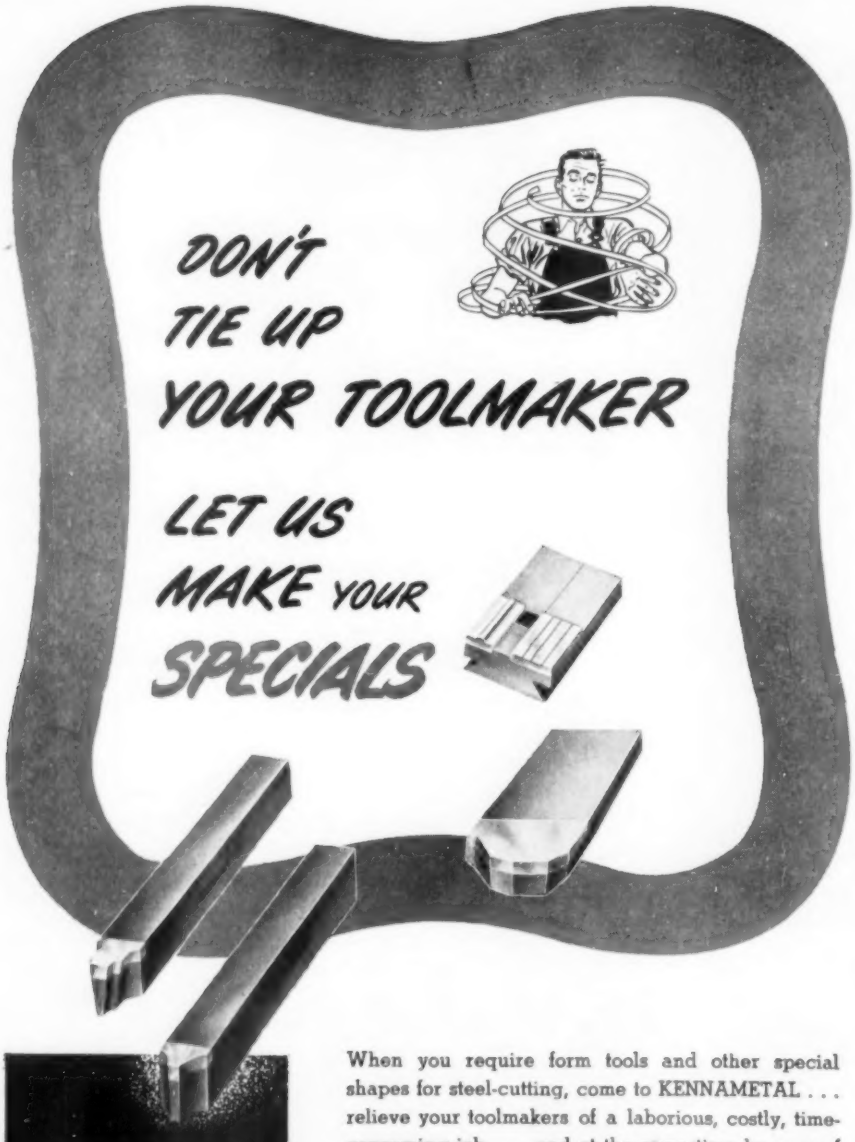
Write for ALL the Facts!

STANDARD SIZES AND WEIGHTS

12" x 18"	75 lbs.	20" x 30"	275 lbs.
18" x 24"	160 lbs.	24" x 35"	480 lbs.

Special Sizes on Request. Prices are Reasonable. Write for Illustrated Descriptive Circular.

THE HERMAN STONE CO.
1241 Leonhard Street, Dayton 4, Ohio



"SPECIAL" SERVICE

When you need "specials" call in our nearest Field Engineer who is fully qualified to help you. Or... send us drawing, sketch, or blue print with all angles and sizes shown. Specify grade of KENNAMETAL or describe work to be done. If chip breaker is needed, indicate on drawing, or give feed and depth of cut. For complete instructions see our new Tool Manual. If you don't have it, write for your copy today.

When you require form tools and other special shapes for steel-cutting, come to KENNAMETAL . . . relieve your toolmakers of a laborious, costly, time-consuming job . . . and at the same time be sure of highest degree of tool performance.

KENNAMETAL special tool service provides the facilities, experience, and skilled personnel that few, if any, machine shops have need for or can afford to maintain. By using this service you obtain the help of a staff of trained tool engineers, whose advice assures you of getting the right grade of KENNAMETAL, properly ground to accurate rake and cutting edge angles.

Next time you need "specials," give the job to KENNAMETAL specialists. Depending on requirements, we will economically and promptly supply either complete tools, or formed tips for brazing to shanks in your own shop. Our Catalog 43-C contains a wealth of information on KENNAMETAL tools for all steel-cutting purposes. Write for your copy.

KENNAMETAL

Trade Mark Reg. U.S. Pat. Off.

KENNAMETAL *Inc.*

600 LLOYD AVE., LATROBE, PA.

SUPERIOR CEMENTED CARBIDES

positions and atomic hydrogen welding were shown.

Toronto: Election of officers was an added feature at the February meeting. James B. McRae, formerly 1st vice-chairman, became chapter chairman. Other officers elected were: 1st vice-chairman, Eric Crawford; 2nd vice-chairman, Walter W. Appleton; secretary, John Burke, and treasurer, Charles Neal. Past chairman buttons were presented to Ed Barker and Norm Wearn by chairman Fred Schutte.

J. W. Cable, research engineer, Induction Heating Corp., spoke on induction heating at the technical session. He illustrated many ingenious fixtures and interesting time cycles and heating control examples.

Tri-Cities: At the Feb. 9 meeting held at the Blackhawk Hotel, Davenport, Iowa, Adam Gabriel of Acme Industrial Co. spoke on "Light Waves and Their Uses in Shop Measurements."

He discussed precision measurements with particular reference to the use of light waves, since the wave length of light seems to be the one of the few definite quantities of length in the universe. He described the use of light waves in checking gages and precision parts, and discussed the necessary equipment, illustrating his talk with slides.

Twin-Cities: H. B. Whitlock of the Monsanto Chemical Co., was principal speaker at the Jan. 12 meeting in Minneapolis.

He talked on "Molds and Their Relation to Plastics." Also on the program was a talk by Mr. Moxness of the Minnneapolis Honeywell Regulator Co., who outlined developments in "Transfer Molding of Phenolic Plastics." Following this talk, Mr. Heik of the Girdler Electric Co. spoke on electronic heating as applied to plastic molding. Approximately 75 members attended.

At the Feb. 16 meeting, Adam Gabriel, Acme Industrial Co., talked on "Light Waves and Their Uses in Shop Measurements."

Twin States: Principal speaker at the technical session at the Feb. 9 meeting, held in the Masonic Temple in Springfield, was H. M. Huffman, field engineer for Cincinnati Milling and Grinding Machine Co. He was introduced by Robert Gillette of Jones & Lamson Machine Co.

Mr. Huffman spoke on "Cutter Sharpening Practice," illustrating his address with slides. He talked on common problems in cutter grinding, such as tool room set-ups and types of wheels. He also discussed methods of preserving and reconditioning badly worn cutters.

Officers elected at the meeting are: Chairman, Ken Aiken; 1st vice-chairman, George Morin; 2nd vice-chairman, William Farrell; treasurer, Prescott Lovejoy; secretary, Raymond Streeter. Three war films were shown entitled "Battle of Midway," "Rendova & Munda" and "Baptism of Fire."

Wichita: Principal business of the Feb. 8 meeting, held at Droll's English Grill,

(Continued on page 212)

from simplest

DIES

to most exacting

•

GAUGES — TOOLS — FIXTURES
JIGS — SPECIAL MACHINES
DESIGNING & ENGINEERING
HIGH PRODUCTION STAMPING

•

BARTH STAMPING & MACHINE WORKS

Die & Tool Makers

W. 34th and Denison Cleveland 9, O.

FOR INDUSTRIAL OIL PURIFYING

Specify **HILCO**

HYFLOW OIL FILTERS

HILCO Hyflow Oil Filters are used for filtering all types of industrial oils such as used for cutting and lubricating. Units are available for stationary use or portable operation for moving from one machine tool to another.

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Write for ALL the Facts!

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12" x 18".....75 lbs.	20" x 30"....275 lbs.
18" x 24"....160 lbs.	24" x 35"....480 lbs.

Special Sizes on Request. Prices are Reasonable. Write for Illustrated Descriptive Circular.

THE HERMAN STONE CO.
1241 Leonhard Street, Dayton 4, Ohio

LOOK FOR THE BROWN AND YELLOW W-S CARTON

W-S Standard Reamers with Carbide tips. Tapered shank (illustrated) and straight shank types. All shanks hardened at no extra cost. Sizes: ¼ to 1½

STANDARD REAMERS
available from stock

REAMERS and many other cutting tools formerly in the "special" class are STANDARD with us. The majority of these STANDARD cutters is in stock *most of the time.* Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is tipped with the correct grade of carbide to do the best possible cutting job on the metals for which the tool was ordered.

Carbide tipped tools are not just a specialty with us . . . we make them *exclusively.* You can *expect* and *get* uniform, high quality results with W-S tools. Write for new FREE Catalog 144 and latest prices. WENDT-SONIS COMPANY, HANNIBAL, MISSOURI. Factory Warehouse: Long Beach, California.

SAVE TIME . . . wire or phone your requirements!

W-S Carbide Tipped Core Drills available in straight and tapered shanks. Sizes: ½ to 1½.

Concentricity of W-S Carbide Tipped Centers is guaranteed to within .0002" or less.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

REAMERS · CENTERS · CORE DRILLS · COUNTERBORES · TOOL BITS · SPOT FACERS
END MILLS · HOLLOW MILLS · ROLLER TURNING TOOLS · BORING TOOLS · SPECIAL TOOLS

was the annual election of chapter officers. Donald H. Kirk was elected chairman for the ensuing year. Other officers elected are: 1st vice-chairman, Harry Giwosky; 2nd vice-chairman, Harold J. Bales; secretary, Roy W. Osburn, and treasurer, Jack W. Kice.

Windsor: At the Jan. 10 meeting, designated as "Canadian Engineering & Tool Night", members were guests of William E. Tregenza, president of the Canadian Engineering & Tool Co.

For the technical session, a group of questions was prepared in advance by the executive committee and certain members qualified to provide the answers were called upon to do so. Other members were then invited to confirm or disagree with the answers given. It was generally agreed that this experimental meeting had been successful and that it could be repeated at a later date.

Worcester: The slate of candidates for next year's officers brought in by the nominating committee at the Feb. 1 meeting include: Chairman, Herman Libby; 1st vice-chairman, F. W. McQuestion; 2nd vice-chairman, George Haire; secretary, Harvey Allisen, and treasurer, Carl Schofield.

H. M. Huffman of the Cincinnati Milling and Grinding Machine Co. gave a talk on "Cutter Sharpening Practice" at the technical session. A picture entitled "Sand and Flame," showing the manufacture of glass products was shown through the courtesy of Chevrolet Motor Co.

* * *

March Meetings

★

Binghamton: Mar. 8, Arlington Hotel. Installation of officers.

Cincinnati: Mar. 14. Elections. Also dinner dance, Mar. 18, Hotel Alms.

Fond du Lac: Mar. 11, Hotel Ahearn, Oshkosh. Topic, "Special Machinery for War Production."

Fort Wayne: Mar. 8, Chamber of Commerce. Speakers—Otto W. Winter, past A. S. T. E. president; A. E. (Handy Andy) Rylander, technical editor, The Tool Engineer.

Milwaukee: March 9.

New Haven: Mar. 9, Duncan Hotel. C. H. Whitlock, Monsanto Chemical Co., will talk on "The Future of Plastics."

Rochester: Mar. 8, Sagamore Hotel. Motion pictures of hunting expedition into Alaska.

South Bend: Mar. 3, Indiana Club. P. M. LaHue, Westinghouse Electric and Mfg. Co., will talk on "Electronics at Work."

Toledo: Mar. 8, Toledo Yacht Club. H. E. Linsley, Wright Aeronautical Corp., will speak on "Aircraft Engines on the Production Line."

THE END

FOR CLOSER TOLERANCES IN
Precision DRILLING

USE ACME
DRILL JIG
BUSHINGS

★Close tolerances, precision drilling and other rigid specifications must be adhered to in the manufacture of critical war products. And Acme has been helping war industries to meet these requirements by supplying drill jig bushings that assure accurate location of drilled holes.

Wartime demands, however, required no change in manufacturing methods at Acme. The same standards of precision that existed prior to the war prevail today. And during peacetime, Acme bushings will continue to serve industry efficiently in the manufacture of post-war products.

In war or peace, make Acme your bushing headquarters.

ACME INDUSTRIAL CO.

Makers of Standardized Jig and Fixture Bushings

208 N. Laflin St. MONroe 4122 Chicago, Ill.

GAMMONS
OF
Manchester

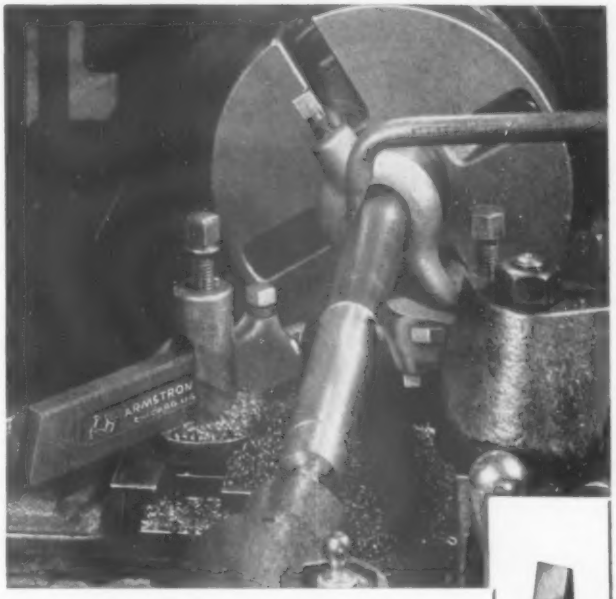
PRODUCTION TOOLS

ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

THE GAMMONS-HOAGLUND CO., MANCHESTER, CONN.

ARMSTRONG

Carbide TOOL HOLDERS



Standard Shape
Armide Cutters

Armide (Carbide Tipped) Cutters and ARMSTRONG ***Carbide*** TOOL HOLDERS can increase your output on long-runs and tough or hard steels. They increase the interval between tool re-grindings from 20 to 50 times. They cut the toughest and hardest steels easily.

Armide Cutters come in 5 standard cutting shapes—"A" Right-hand Turning, "B" Left-hand Turning, "C" Square Nose, "D" Round Nose (for general turning and facing), and "E" 60° Threading. 10 sizes.

ARMSTRONG ***Carbide*** TOOL HOLDERS, come with "Straight", "R. H. Off-set" or "L.H. Off-set" Shanks. They hold cutters at 180° (proper for carbide) provide extended, close-up support to the cutting edge, and are extremely rigid.

Write for "Carbide" Circular.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

360 N. Francisco Ave., Chicago 12, U.S.A.
Eastern Warehouse & Sales:
199 Lafayette St., New York

"A"

"B"

"C"

"D"

"E"

THE PASSING PARADE

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

THE EVER-CHANGING SCENE IN MASS MANUFACTURING

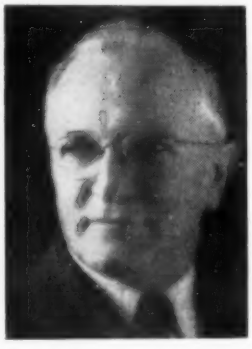
Dr. Irving Langmuir, associate director of the General Electric Research Laboratory has been awarded the Faraday Medal of the Institution of Electrical Engineers in London, according to a company announcement. He is the fourth American to receive the award, established in 1922 for worldwide services to electric science and engineering.

Dr. Langmuir received the Nobel prize in 1932 and has been the recipient of many other scientific awards. Actual presentation of the Faraday Medal award will be made later.

George R. Rich, chief design engineer of the Tennessee Valley Authority has been appointed a member of the sectional committee on shaft couplings of the American Standards Association. The committee has already approved a standard for shaft couplings and has also drawn up a primer on tolerances for cylindrical fits.

Guy A. Swartz, founder and president of the Swartz Tool Products Co. Detroit, and a well-known figure throughout the automotive industry as a master tool maker and designer, died February 8. He was 61 years old.

Born near Bellefonte, Penna., he came to Detroit nearly 30 years ago, eventually becoming master mechanic



Guy A. Swartz

at Timken Axle Co. and later associating with the George A. Gloar Co. He founded the Swartz Tool Products Co. in 1933.

Westinghouse Electric & Manufacturing Co. announces that it has awarded its highest honor—The Order of Merit— to **William O. Lippman,** works manager of its East Springfield Works, for his leadership in converting the plant from peacetime to wartime production.

Mr. Lippman joined the Westinghouse organization in 1918 after his graduation as an electrical engineer from Pennsylvania State College. In 1923 he was transferred to the East Springfield Works as supervisor of inspection and testing. Later, he took charge of industrial relations and was made works manager in 1939.

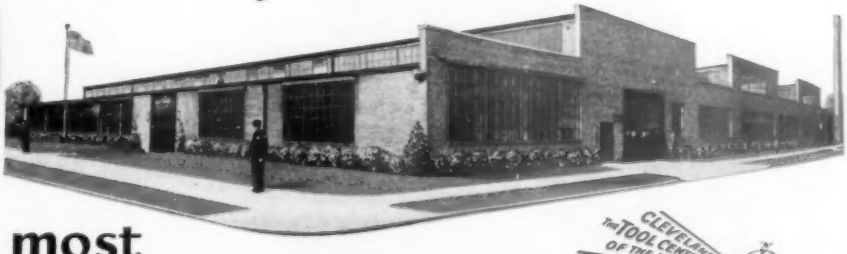
Allan E. Hall, manager of the milling machinery department of Allis-Chalmers Manufacturing Co., died January 17 at Milwaukee at the age of 73.

An Allis-Chalmers employee since 1909, Mr. Hall had headed the milling department since 1920. A graduate of Pennsylvania State College and Yale University, from which he received his bachelor of philosophy degree in 1895, Mr. Hall was well known throughout the industry. He was a member of the Society of Sigma Xi, American Society of Mechanical Engineers, and the American Standards Association. He formerly was president of the Cereal Machinery Association and of the Multiple V-Belt Drive Association.

(Continued on page 216)

One of our two engineering departments where expert production knowledge is translated into designs for production tooling equipment

From this specially designed finely equipped plant ★



★ *come*

industry's most efficient production tools

CLEVELAND The TOOL CENTER OF THE U.S.A.

Foundation stones of the McKinney organization are embedded in almost 25 years of successful, highly specialized activity; and today, this organization occupies a prominent position among leaders of the industry.

Wisdom and censorship still require that certain information be held in strict confidence. It can be said, however, that tool designs for producing many amazing devices and the actual tools that have built many of our high powered war weapons, have gone forth from the McKinney plant.

Through having done nothing else for so many years the McKinney organization is exceptionally competent to design and build tooling equipment embodying extreme accuracy, ease and facility of operation—and capacity for large volume production.

Consult us on current or contemplated work. Drop in and inspect our plant—write for a bulletin describing our facilities—have a McKinney engineer call for a discussion—or send blueprints on any pending job on which we can possibly be of assistance.

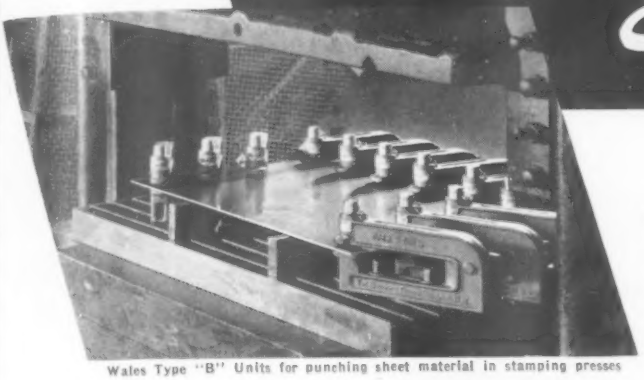
McKINNEY TOOL & MFG. CO. CLEVELAND

DESIGNERS and BUILDERS of PRECISION TOOLING Since 1920

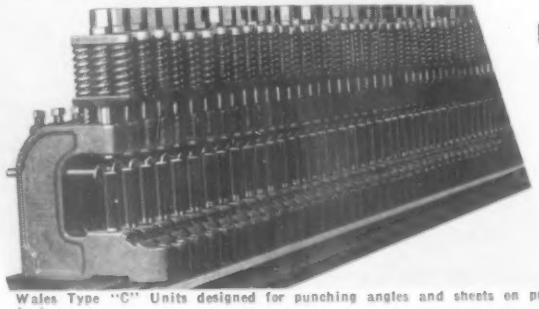
1671 ARABELLA ROAD

Tools-Dies-Jigs-Fixtures-Special Machinery

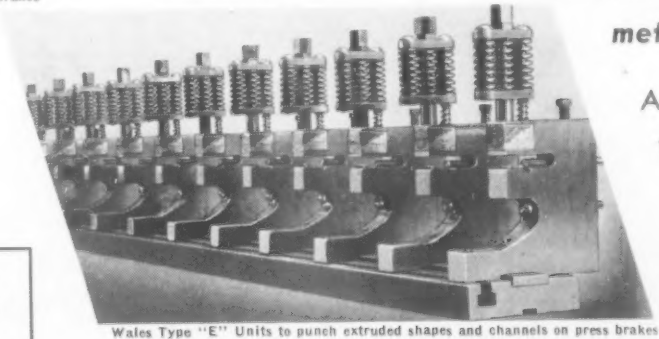
A SUGGESTION FROM WALES-STRIPPIT *Engineers*



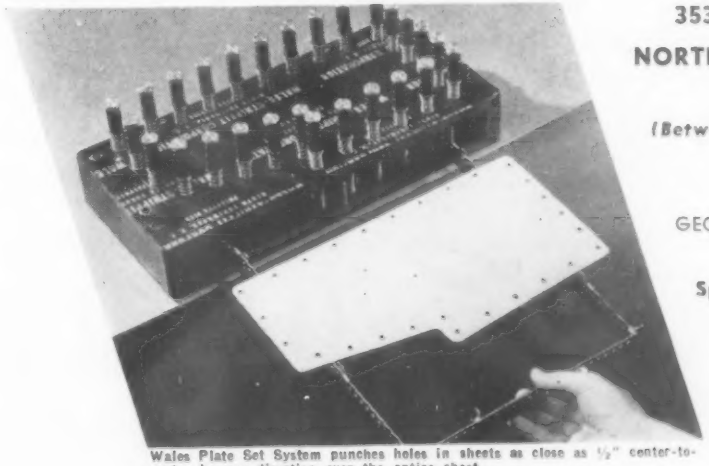
Wales Type "B" Units for punching sheet material in stamping presses



Wales Type "C" Units designed for punching angles and sheets on press brakes



Wales Type "E" Units to punch extruded shapes and channels on press brakes



Wales Plate Set System punches holes in sheets as close as ½" center-to-center in any direction over the entire sheet

Before spending valuable time and effort designing and building special hole punching dies, check with Wales-Strippit engineers who may have solved your particular hole punching problems by using various adaptations of standard Wales Hole Punching Units.

Join the hundreds of metal fabricators who make it a rule to call on Wales-Strippit engineers ***before*** putting holes in sheets, channels, and angles ***by any method.***

As a timely suggestion, call on Wales-Strippit engineers ***FIRST.***

TIME-SAVING, MONEY-SAVING FEATURES

1. Usual time-consuming adjustments of conventional set-ups are eliminated
2. Punch and die held in perfect alignment by holder
3. Each unit is independent and self-contained
4. Straight line, staggered or scattered patterns punched with same units
5. Same group of units may be used interchangeably on press brakes and stamping presses
6. Nothing attached to press ram
7. Individual units may be instantly removed or reset
8. Punches may be interchanged without disturbing set-up
9. Die setting and press "down time" reduced to minutes
10. Same units may be used and reused in unlimited patterns

WALES-STRIPPIT CORPORATION

353 Payne Avenue

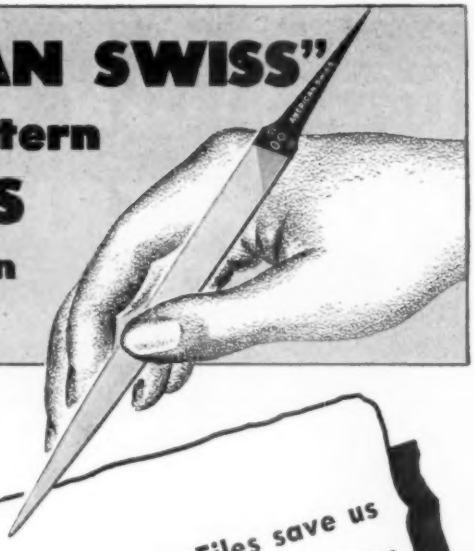
NORTH TONAWANDA, N.Y.

(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President

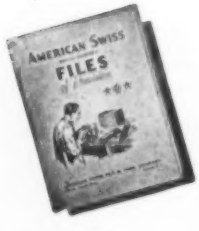
Specialists in Punching and Notching Equipment

"AMERICAN SWISS"
Swiss-Pattern FILES
write their own testimonials



At the plant of a representative tool manufacturer:

"'AMERICAN SWISS' Swiss-Pattern Files save us 25% to 35% in file costs. It is remarkable the way they stand the hard usage we subject them to."

The experience of this manufacturer has been duplicated in plants all over the country, as proven by reports which we have continuously received throughout the 40 years during which we have specialized in the manufacture of Swiss-Pattern files.

"American Swiss" files save filing costs because these precision-made tools have longer filing surface than others, their clean, sharp teeth cut better and faster, and their uniform hardness withstands hard wear and long usage.

FREE CATALOG SENT ON REQUEST

For lowest costs and best results in your accurate and intricate filing work, be sure to insist on "American Swiss" Swiss-Pattern files . . . obtainable from our Distributor.

American Swiss File & Tool Co., Elizabeth, N. J.

ASK FOR THEM BY NAME

American Swiss ★ ONLY THE BEST ★

SWISS PATTERN FILES

PASSING PARADE

Bennett S. Chapple, Jr. has been appointed as assistant to the president of Firth-Sterling Steel Co., according to **L. Gerald Firth,** president.

Mr. Chapple formerly was assistant manager of sales of the New York district of the Carnegie-Illinois Steel Corporation, where he previously served as manager of sales promotion and as assistant to the vice-president in charge of operations. Prior to his association with Carnegie-Illinois, he was connected with Insulated Steel Construction Co. and American Rolling Mill Co.

B. S. Chapple, Jr.

Paul W. Polk

Sheffield Corporation announces that **Paul W. Polk,** vice-president, has been granted a leave of absence to accept a commission as lieutenant (j.g.) in the United States Navy. He has already reported for duty.

Widely known in the gage, precision instrument, and machine tool industry, Mr. Polk has had supervision of all educational, distribution, and field activities. **Oscar A. Ahlers,** assistant to the president, will serve as acting head of the distribution division, according to **Louis Polk,** president and general manager.

Died: **Walter H. Hallsteen,** vice president and treasurer of the Ilg Electric Ventilating Co., on January 15 at the age of 53.

A graduate of Armour Institute in 1914 with a mechanical engineering degree, Mr. Hallsteen joined the Ilg staff in 1916. After serving for some time in the sales department he entered the factory office as assistant to the purchaser and shortly thereafter was promoted and placed in charge of the purchasing department.

W. H. Hallsteen

Henry Rowold

Henry Rowold has been appointed vice president of Mack-International Motor Truck Corp., according to **F.F. Staniford,** president.

A Mack employee since 1919, Mr. Rowold formerly had been executive assistant to the president. He is a committee member of the Central Truck Tire Rating Board of OPA.

Died: **Raymond F. Hughes,** assistant chief engineer of Great Lakes Steel

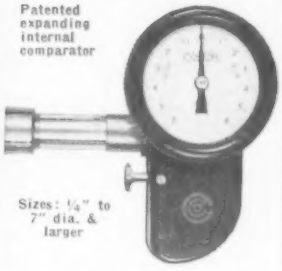
(Continued on page 218)

"We licked our toughest gaging problem with COMTORPLUG!"

Gives average worker ability to gage bores to fractions of .0001".

COMTORPLUG

Patented expanding internal comparator



Sizes: ¼" to 7" dia. & larger

Unique automatic features of Comtorplug assure that relatively unskilled users will get accurate results, gaging precision bores to fractions of .0001". You can put this comparator in the hands of machine operators and bench inspectors, as well as supervising inspectors, and get surprising results in the way of improved quality starting right at the machine. Comtorplug checks size, as well as out-of-round, front or back taper, barrel shape, bell mouth, etc.

Request Bulletin 29

THE COMTOR CO.
70 Rumford Avenue
Waltham, Mass.

What I Like About DE-STA-CO ARBOR SPACERS

De-Sta-Co spacers save a lot of time when setting milling machine cutters . . . they do away with much idle machine time and thus increase production . . . they are offered in all standard arbor sizes and in thicknesses from .001" up, including long spacers cut from bar stock and ground to decimal . . . they are made from metal and therefore are not affected by temperature changes . . . they may be used over and over again, which makes them the lowest in cost of any arbor spacers you can buy.

SEND $1.00, giving us size of your arbor, and we will send you a special trial assortment of spacers, sufficient for average use on a machine.

DETROIT STAMPING CO.
Established Over 25 Years
356 Midland Ave • Detroit 3, Mich.

Accuracy Assured!

BY THE SMITH PROCESS OF PRODUCING FLAT SURFACES

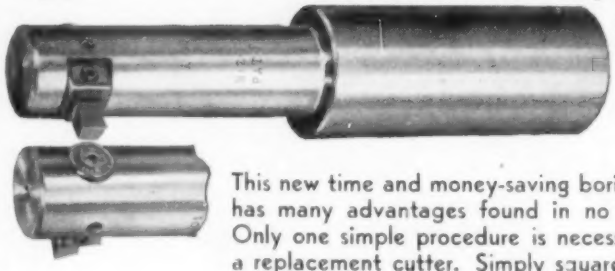
WRITE, WIRE or PHONE

SMITH TOOL & ENGINEERING CO.
862 SANDUSKY AVE., BUCYRUS, OHIO

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

NEW NASH-ZEMPEL BORING BAR INSERT

Micrometer-Adjustable



SHORT PIECES OF SCRAP TOOL BITS MAY BE USED AS REPLACEMENT CUTTERS

This new time and money-saving boring bar insert has many advantages found in no other insert. Only one simple procedure is necessary to make a replacement cutter. Simply square up the cutter stock to fit the square hole in the insert. No special tools necessary.

The insert can be installed on any bar available by a simple boring and milling operation. The locating head of the boring bar insert fits snugly into the recessed slot of the bar. The set screw in the boring bar locates the insert and draws the head firmly against the shoulder of the recessed slot in the bar. Accurate location point is always maintained.

Write at once for complete, descriptive bulletin

NASH-ZEMPEL TOOLS

Division of J. M. Nash Company

2363 NORTH 30TH ST. **MILWAUKEE 10, WIS.**

GET TOMORROW'S WELDING DONE TODAY

...with the help of Ransome Positioners

It is no exaggeration to say you can do just that. For, when Ransome equipment is installed, your welders will no longer have to use their time and energy in shifting the position of their work . . . will no longer be delayed by waiting for crane service.

These versatile positioners put welding into high gear . . . give each welder full control over his or her production . . . provide a downhand position for every weld, with resulting improvement in quality of welds and substantial savings in rods . . . and get out today the work that, with old methods, would still be in your shop tomorrow or next week.

Write for full details, stating the general nature of your welding job.

RANSOME MACHINERY COMPANY

Ransome WELDING POSITIONERS

PASSING PARADE

Corp., at Detroit, February 14. He was 46 years old.

Before going to Detroit in 1929, he was connected with the steel industry in Youngstown. He was a member of the Engineering Society of Detroit, the Association of Iron and Steel Engineers and the American Society of Mechanical Engineers.

Russell M. Allen, formerly general manager of sales at Allegheny Ludlum Steel Corp., has been elected vice-president in charge of sales, according to **H. G. Batcheller**, president.

Starting his career with the Allegheny Steel Co. in 1920 as a production man in the mill, Mr. Allen was successively a member of the sales department, district manager of the Chicago territory, assistant sales manager, and general manager of sales since 1940.

R. M. Allen

H. G. Batcheller

Also announced by the corporation is the appointment of **P. E. Floyd** formerly sales manager of the Chicago district, to the position of assistant general manager of sales. He recently returned from Washington, D.C. where he held a responsible post as chief of the stainless section of the steel division of the War Production Board.

Frederick J. Macwilliams, one of the founders of the Abart Gear and Machine Co., Chicago, died January 23. He was 49 years old.

At the time of his death, Mr. Macwilliams was general manager of the company, which he helped to establish in 1931.

Timken Roller Bearing Co. announces the promotion of **H. B. Lilley**, formerly chief inspection engineer, to the position of sales development engineer. He will specialize in the application of mechanical tubing to machine tool products and other engineering applications. A graduate of Carnegie Institute of Technology in 1924, he has served Timken in various capacities connected with inspection of tubular products.

Died: **James A. Nolan**, New York state representative of The Carpenter Steel Co., at Rochester, N. Y., January 17. He was 54 years old and had been associated with the company for 33 years.

Myron M. Eicher has been appointed works manager for Jessop Steel Co., according to a company announcement. He succeeds **Harry Wilson, Jr.**, who was recently advanced to vice-president in charge of operations. Prior to his association with the Jessop organization in 1942 as head of the scheduling

(Continued on page 220)

"The Magna-Sine is Really Worth Twice the Price You Ask for It"

The Magna-Sine is available in two sizes in both single and compound angle models.

A non-magnetic sine-plate built on Magna-Sine principles and with Magna-Sine accuracy but without magnets is also available for faster inspection work.

Says a California Customer

Recently, in straightening out a case of apparent double payment for a Magna-Sine, a customer wrote to us that he thought the Magna-Sine was worth twice what he had paid for it even though he hadn't actually paid for it twice. We appreciate his comment. The truth of the matter is that twice the price of a Magna-Sine and more can be recovered in a very short time in savings that result from its use.

An angular grinding set-up that requires hours using conventional methods can be completed in a few minutes at the very most with the Magna-Sine. Once the set-up is made correctly it will stay that way since there are no loose pieces to slide under pressure. The part is held securely, but without distortion, and can be released instantly. As a result you get more accurate set-ups, shorter set-up time, less scrap . . . in short, better work at lower cost with the Magna-Sine. There should be a Magna-Sine available for every grinder in your plant that does an average volume of angular work.

ROBBINS ENGINEERING COMPANY
318 MIDLAND AVENUE • DETROIT 3, MICHIGAN

WILLEY'S

DEALERS
An attractive proposition open in certain territories.

DOUBLE END CARBIDE TOOL GRINDER Model 30

Assures highest accuracy for rough, semi-finish and finish grinding of Tungsten Carbide tipped tools. Its sturdy construction insures a large volume of work on a production basis. Uses 8" vitrified wheel for rough and semi-finish, and 6" diameter wheel for finishing.
Cool Cutting is assured by a steady flow of coolant, force fed by an electrically driven pump.

WRITE FOR FOLDER

Contains complete specifications of Model 30 and other models. Also ask about Willey's Metal, 710, the new cutting grade of Carbide just announced for machining tough Alloy Steels.

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL FEATURES—

1—LOW HUNG DRIVE TO THE SPINDLE
2—ALL POWER DRIVEN PARTS RUNNING IN OIL
3—QUIET RUNNING AT ALL SPEEDS
4—CONCENTRATED AND CONVENIENT CONTROLS
5—CONSTRUCTED ON UNIT PRINCIPLE

THE

CARLTON

MACHINE TOOL COMPANY

CINCINNATI, OHIO, U.S.A.

Light, Easily Handled, Flexible

SWEDISH INTERNAL INDICATOR GAGE

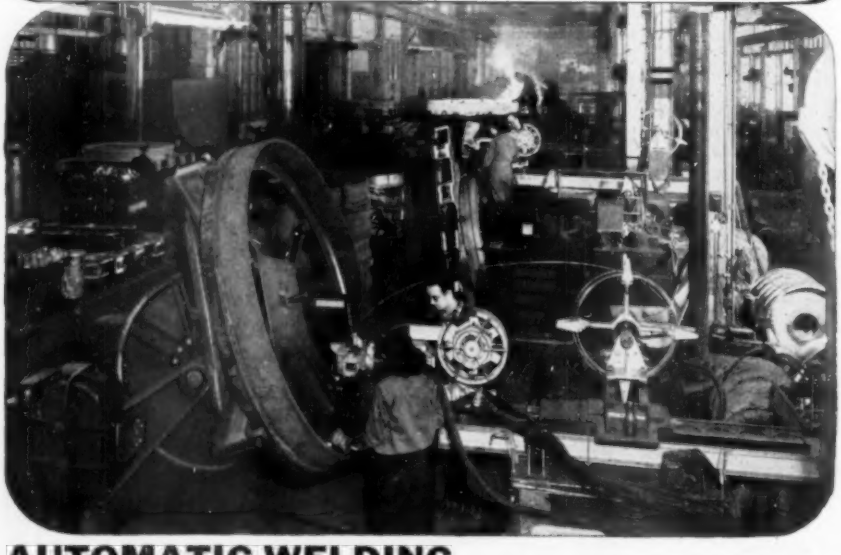
A reliable precision indicator especially designed for rapid, convenient and accurate measurement of internal diameters. Variations of as little as 0.00005" in size, out of round, and taper of bores can be quickly determined. Hundreds are in daily use on production lines and in inspection departments on innumerable applications where close limits on size, roundness and straightness of bore are of prime importance.

Write for Literature

It can be set to any required size direct from Johansson Gage Blocks or Master Ring.

SWEDISH GAGE CO., OF AMERICA
8900 ALPINE AVE., DETROIT 4, MICH.

C-F POSITIONERS



AUTOMATIC WELDING

—is possible on many jobs if you have a C-F Welding Positioner. Coming in 9 sizes (capacities to 30,000 lbs) tables tilt to 135° beyond horizontal and rotate 360°, under push button control. Exclusive C-F Variable-Speed control gives table rotations ranging down to 0 r.p.m. for all sizes.

All C-F Positioners are multi-purpose tools equally efficient on either job or production welding.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO.

1318 S. Kilbourn Ave. Chicago 23, Ill.

department, Mr. Eicher was chief clerk in the scheduling division of the Crucible Steel Company's plant at Midland, Penna.

Leonard F. Rosier, who was loaned by St. Germaine & Associates, New York, to the Brazilian Navy Department, died at Rio de Janeiro, January 15. He had been affiliated with the Greater New York chapter of the American Society of Tool Engineers until his transfer to Brazil.

L. F. Rosier

J. H. Hopwood

Died: **J. H. Hopwood,** national vice-chairman of the program committee of the mid-west area, American Society of Tool Engineers, at Indianapolis, February 1. A past chairman of the Indianapolis chapter, he was instrumental in bringing the society's semi-annual convention to that city last October.

W. S. Long, formerly operations manager of United States Rubber Company's Los Angeles plant, has been appointed Pacific Coast sales manager, mechanical goods, according to **W. H. Cobb,** general manager of the mechanical goods division. Mr. Long will continue in charge of war products activities on the Pacific Coast. **J. M. Miller** will continue as factory manager of the Los Angeles plant, it was announced.

C. B. Allen has been transferred from Washington to the Detroit district of The Reliance Electric & Engineering Co. as an application engineer, according to **James W. Corey,** sales vice-president.

Mr. Allen takes up his Detroit duties following completion of an assignment with the Bureau of Ships, Navy Department, in Washington, for which his services had been lent by Reliance. Previously he had been connected for some time with the Philadelphia and Boston districts of the company.

The Baldwin Locomotive Works announces that **W. H. Holcomb,** assistant to the president, has been appointed vice-president in charge of industrial relations, a newly created office. He has been a member of the Baldwin organization since 1919.

It also was announced by the company that **James J. Nelson,** general manager of Cramp Brass and Iron Foundries Division of the company, was named vice-president of the division. He joined the organization in 1932 as vice-president and sales manager. He has been general manager since August, 1943.

THE END

FOR GENERAL BORING

The angle of the cutting edge and the special helical backed-off form of the front of the tool produces a free-cutting action.

FOR FACING and BOTTOMING

Especially suitable for use on turret lathes and automatics—particularly adaptable for recessing.

FOR INTERNAL THREADING

Engineered to give clearance in chasing internal threads. Capacity from ¼" dia. hole up, and from 2 to 65 threads per inch.

Ask for Catalog A-1139 for Super High-Speed Tools and for A-398 for Carbide Tipped.

BOKUM TOOL CO.
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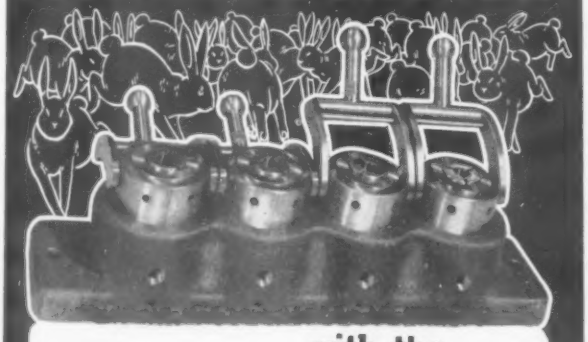
MULTIPLICATION



with the
New ZAGAR MULTIPLE
COLLET HOLDING FIXTURE

● Multiply the advantages of single Zagar Holding Fixtures, and your production, too! Use two, three or four collets and as many multiple fixtures as length of table permits. Mount either parallel with spindle or at right angles. For climb-cutting, mount two fixtures on each side (16 collets on one set-up). Standard Zagar set-ups speed an amazing range of jobs *without special tooling*; now more flexible than ever.

Get New Bulletin E-3-M

GOOD DISTRIBUTORS WANTED

ZAGAR TOOL, INC.
23880 Lakeland Blvd. Cleveland, Ohio

It takes a lot of Chucks . . .
to make a VICTORY

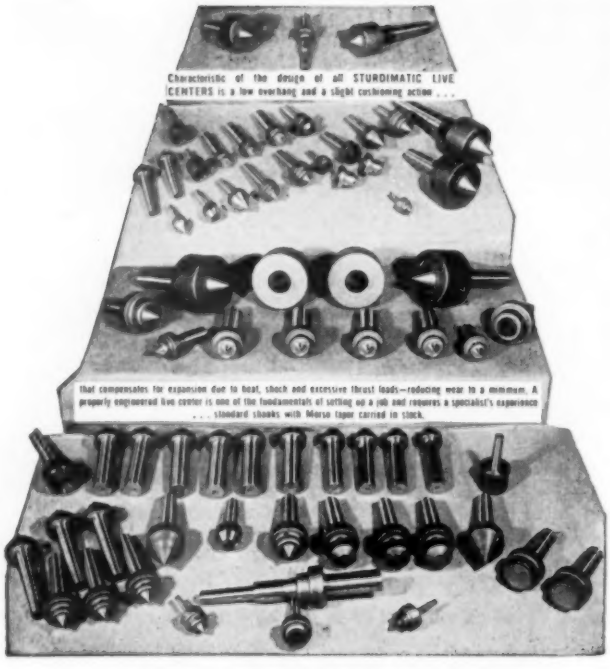
There isn't a piece of mechanical equipment in the war today . . . in the air, on land, on the sea or under it . . . that has not required the services of chucks in its manufacture. As a result, chucks are among the most vital tools and the most needed weapons for the long, strong pull ahead of us. Therefore, we endorse and re-emphasize the Government's urgent call for Tool Conservation.

We know from long experience that most chuck failures are the result of: 1, Lack of lubrication; 2, Overloading; 3, Lack of cleaning.

There are six simple chuck maintenance rules that will save you time, money . . . and CHUCKS. They are printed on handy "Chuck Check" maintenance cards we supply free of charge for distribution to operators. Write for your supply. The Cushman Chuck Co., Hartford 1, Conn.

A WORLD STANDARD FOR PRECISION

CUSHMAN CHUCKS


Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . .
that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock.

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BRIGHTBOY is a *combination* of abrasive and a soft rubber binder. The abrasive is impregnated evenly through the rubber—de-burrs and finishes while the rubber cleans and polishes—all in one operation. The resiliency of the rubber cushions the abrasive action—eliminates operations between a grind and a buff—frequently serves as the final polish. Made in wheels and rods, and in blocks for manual operations.

Ask your dealer or write us for catalogs and Methods and Applications booklet. Brightboy field representatives are at your service.

BRIGHTBOY INDUSTRIAL DIVISION
Weldon Roberts Rubber Co.

WELDON ROBERTS
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DIAMONDS *for Victory*

Cooler dressing
Closer tolerances
Micrometer accuracy

Because: Wing key heat dissipation and absolute diamond lock nib.

● Three grades of diamonds. Common quality $12 per karat. Medium quality $24 per karat. Select quality $48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes ¼ to 10 karat are nib mounted for immediate shipment . . . Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, $1.00 post paid.)

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The Most Complete and Up-to-the-Minute line of Diamond Tools for War Production. Send for Free Catalog and Grinders instruction card.

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Sheldon M. Booth, Pres.
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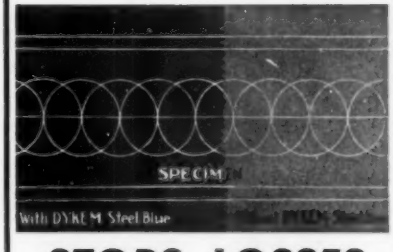
DYKEM STEEL BLUE



STOPS LOSSES
making dies & templates

simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE
DYKEM COMPANY
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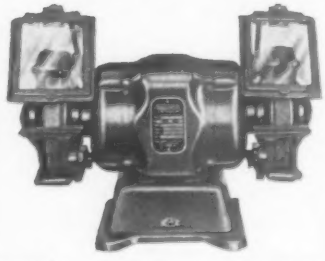
In Canada: 444 Pacific Ave., Toronto, Ont.

BALDOR
BALL BEARING GRINDERS



BUILT FOR HEAVY PRODUCTION SERVICE

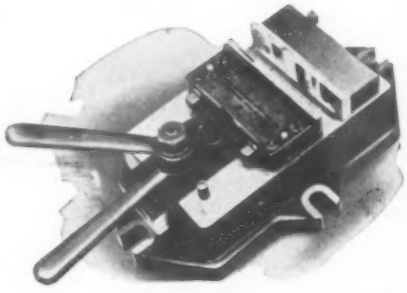
Baldor Grinder No. 612 has Capacitor Type 1/3 HP Motor guaranteed 2 yrs. against burnout. 3440 r.p.m. 110 volt, 60 cy., single phase. 6" x ¾" wheels; enclosed guards; adjustable eye shields and tool rests. Net weight, 61 lbs. **$33.50**

Ask for Bulletin 307
BALDOR ELECTRIC COMPANY
4335 Duncan Ave., St. Louis 10, Mo.

BUILT BY MOTOR SPECIALISTS

THE HARTFORD
'Four Point' MILLING VISE

ACCURACY
POWER
SPEED
STRENGTH



★SPEED is vital in production milling work today. This vise is designed and built to take the pressure of feeds and speeds of modern milling machines.

★POWER, STRENGTH, and ACCURACY also are required of a milling vise that meets the demands of modern mechanized production. This Hartford vise embodies all of these characteristics, backed up by years of successful performance in large nationally known manufacturing plants.

WRITE FOR LITERATURE

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

In War, as in Peace...

CERRO ALLOYS
SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

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AN *All-Electric* ADJUSTABLE-SPEED DRIVE
FOR A-C. CIRCUITS
SPEED RANGES UP TO 16 TO 1
SIZES — ¼ TO 30 hp

RELIANCE VOS DRIVE

1 DIRECT DRIVE. Lower cost, because fewer parts (no intermediate speed-changing device). Power is closer to where it is needed. Use less space. Streamline your machine design.

2 SPEED CONTROL CONVENIENCE WITHOUT LIMITATIONS. Place speed-changer and start-stop button at any convenient point to which a wire can be run. Control always within easy reach.

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for Toolroom and Production
Size 32" x 8"
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provides efficiency and speed to produce small parts requiring the extreme accuracy essential for war production.

Rigid well balanced design, combined with central control make for easy operation, permits the release of highly skilled labor for other tasks.

A wide selection of speeds meets all requirements for toolroom and production.

There is an ample variety of feeds from which to choose the right feed for material or accuracy requirements.

Timken bearings and helical drive gears are other features to assure a smooth performance. Write today for specifications and prices.

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156 BROADWAY • NEW YORK, N. Y.

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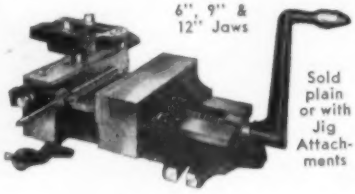

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Ask about our Knurl Holder Fitting Lathe Turret

Request Illustrated Price Circulars

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T. H. L. FRONT LEVER BENCH PUNCH

Built for hard tough work — die cannot lose alignment with punch — all parts interchangeable.

Capacity ½" holes through $\frac{3}{16}$" steel; $\frac{7}{16}$" through ¼" steel. Can also be made for holes up to $1\frac{3}{8}$" in thinner metal. Stock punches and dies available from $\frac{1}{16}$" to ½" by 64ths.

Weight, 70 lbs.

PRICE WITH ONE PUNCH AND ONE DIE—

$50.00

Immediate Shipment

T. H. LEWTHWAITE MACHINE CO.

(Est. 1890)

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THE BRAMSON PUBLISHING COMPANY
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WANTED
A PRODUCT TO MANUFACTURE

Organization of several hundred skilled designers, engineers, toolmakers, and a modern tool room seeks post-war product or machine. Complete facilities for development — engineering — manufacturing — sales and advertising. Will be handled on royalty basis or any other satisfactory arrangement. Box 805, THE TOOL ENGINEER.

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MECHANICAL MACHINE or PRODUCT DESIGNER

For instrument plant in Denver. For war work now, later post-war work assured. Must have minimum of 10 years on board on actual design, in order to take charge of our design department. Top pay in region offered for right man. Box 803, THE TOOL ENGINEER.

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Plant superintendent with complete knowledge of tool industry. Must have previous experience as superintendent in allied industry. Plant located in Chicago area. Post-war products same as present products. Unlimited expansion possibilities. State fully all experience and personal background. Box 804, THE TOOL ENGINEER.

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WANTED: MANUFACTURERS' REPRESENTATIVE

A number of territories open to sell on commission basis outstanding Machine Tool Accessory line, also a Flexible Coupling of exceptional merit. Write giving full details as to present connections and past experiences. All correspondence kept confidential. Box 802, THE TOOL ENGINEER.

SITUATIONS WANTED

Manufacturers representative covering Illinois and Iowa wants additional tool lines—milling cutters, taps, special high speed and carbide tools, grinding wheels, or other lines. Post Office Box 321, Davenport, Iowa.

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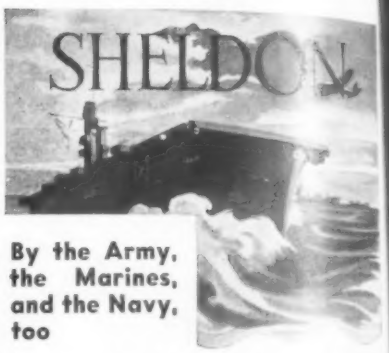
Manufacturing rights for sale on Royalty basis. Completely new design of Turret Lathe for bar or chucking operations. Fully automatic for bar work. No cams, no gears. Over 1000 spindle speeds and feeds, automatically changed without stopping machine, at indexing operation. Entirely new design of turret, non-lifting and non-tilting, with Timken bearings above and below spindle center. Speeds pre-selected and pre-set for each turret position. Bar capacity to 3½". Chucking capacity 15" diameter. Orders on hand and others pending. Box 806, THE TOOL ENGINEER.

SHELDON



By the Army, the Marines, and the Navy, too

SHELDON Precision Lathes have been selected by the Army for its Mobile Machine-Shop Units, by the Marine Corps for its trailerized shops and by the Navy as the ideal lathes for several types of repair shops aboard ship and ashore.

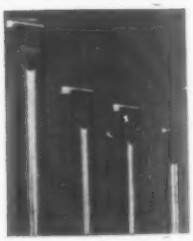
SHELDON Lathes are also widely used in British, Canadian, South African, Russian and other allied factories to speed the production and maintenance of war material . . . proof of worldwide SHELDON accuracy and dependability.

SHELDON 10" (1-inch collet capacity) Precision Lathe and Bench Unit with E-type underneath motor drive.

SHELDON MACHINE CO., INC.

4252 N. Knox Ave. **Chicago 41, U. S. A.**

EVEREDE



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The ONLY Boring Bars with The Economical Triangular Bit

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Adjustable to fit various size lathes

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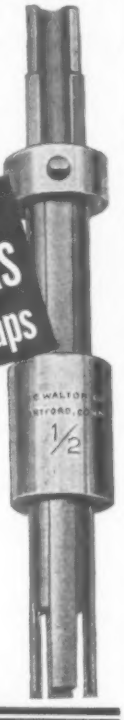
48 Hour Service

Send us your damaged tap extractors. All broken holders, collars, and sleeves will be replaced without charge. Steel fingers replaced at standard list prices. "Tools are Weapons—treat 'em right!"



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- *No annealing
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Immediate Shipment. Stock sizes No. 4 to 1½", 2, 3, 4 flutes. 30 day free trial.

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CABINET BASE
BALL BEARING TABLE
FIXED TABLE HEIGHT
BACKED BY 35 YEARS OF EXPERIENCE IN BUILDING PRECISION GRINDING MACHINES.

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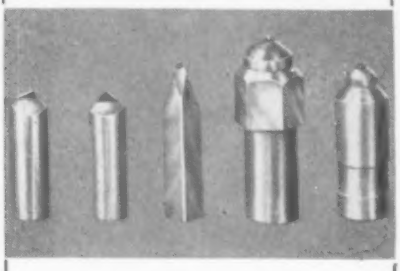

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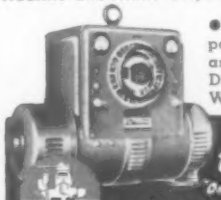

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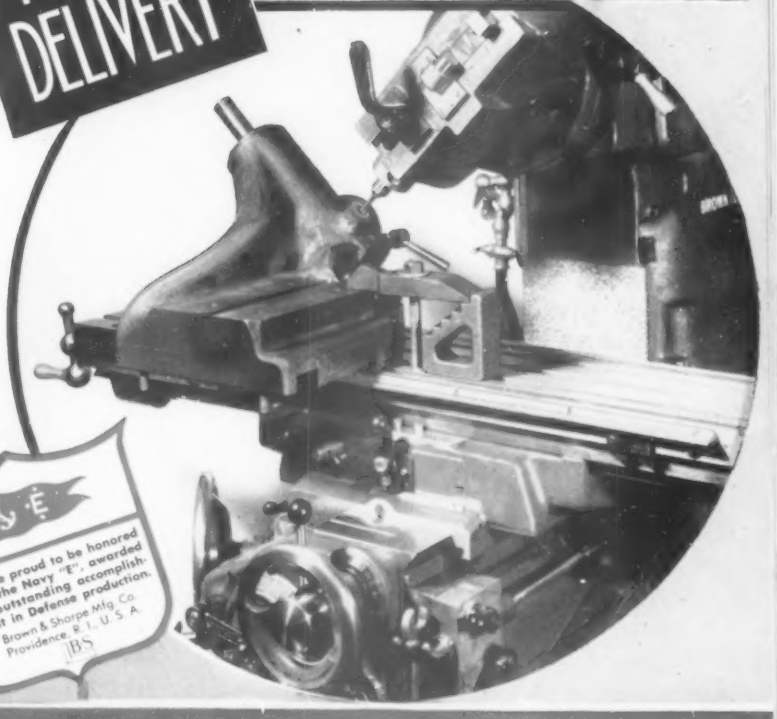

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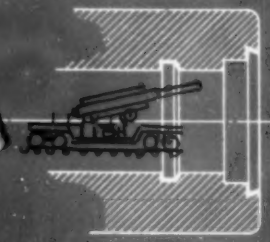
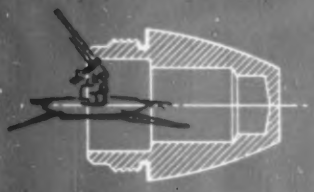
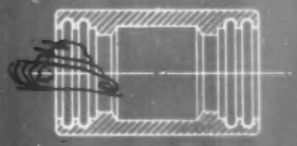


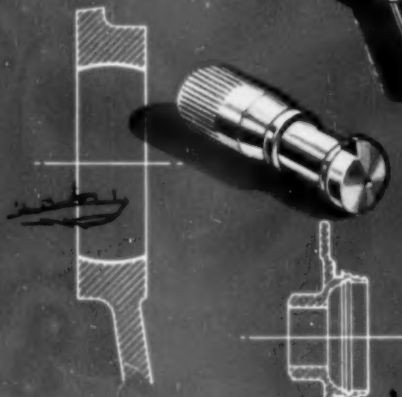
FORMED RECESSES MADE IN ONE OPERATION ON DETONATOR BUSHINGS OF LARGE CALIBRE MOTORIZED ARTILLERY RIFLES.



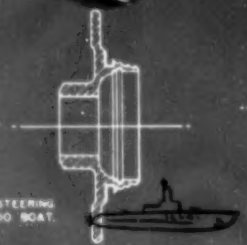
GROOVE FOR THREAD CLEARANCE CUT ON ANTI-AIRCRAFT PROJECTILE WITH AUTOMATIC "NECKING" TOOL.



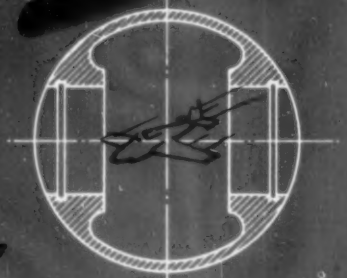
CASTING OF PART FOR ARMY TANK ON WHICH TWO RECESSES ARE MADE AT ONE TIME.



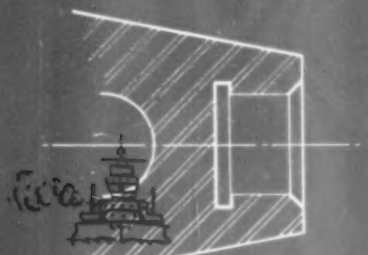
RADIUS CUT MADE IN PART FOR STEERING GEAR MECHANISM OF POWER TORPEDO BOAT.



BOTH INSIDE AND OUTSIDE CLEARANCE GROOVES CUT IN ONE OPERATION ON OIL TANK CAPS FOR SUBMARINES.



SNAP-RING GROOVES CUT IN WRIST PIN HOLE OF AIRPLANE PISTONS.



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